

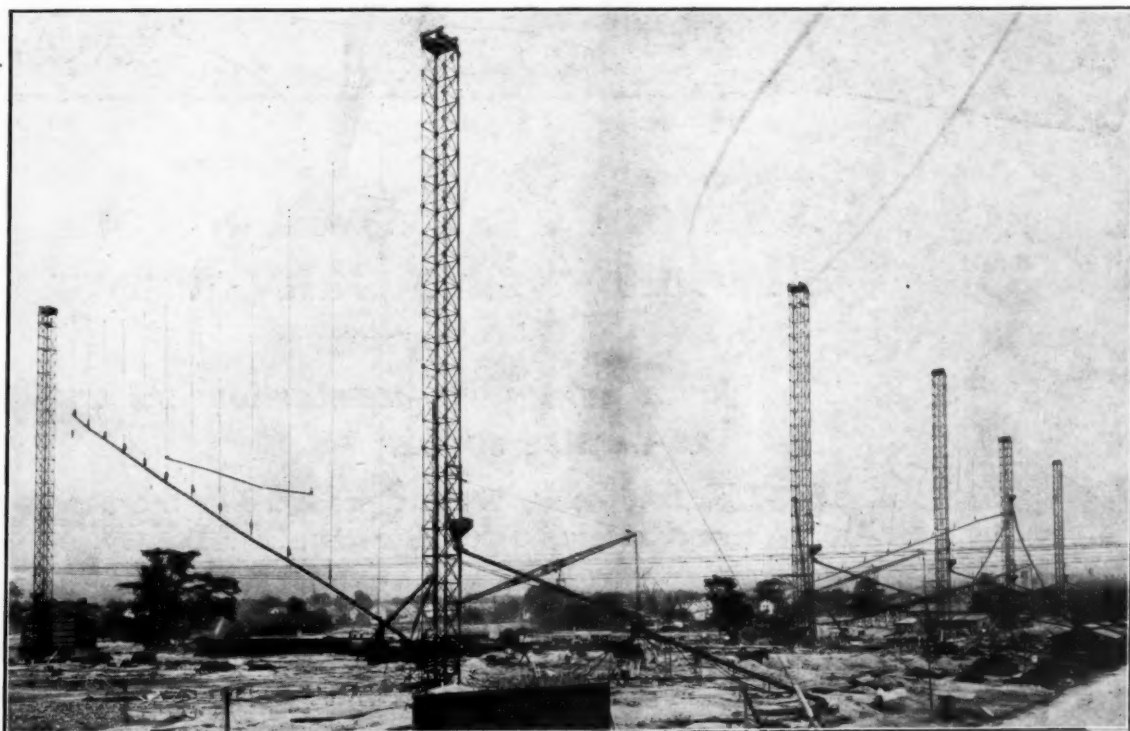
MAR 8 1922

PUBLIC WORKS

CITY

COUNTY

STATE



HOISTING AND REHOISTING TOWERS AND COUNTERBALANCED CHUTES FOR DISTRIBUTING CONCRETE FROM MIXERS. "MIXING AND PLACING 50,000 YARDS OF CONCRETE."

IN THIS ISSUE

Activated Sludge Sewage Disposal Plant at Gastonia, N. C.

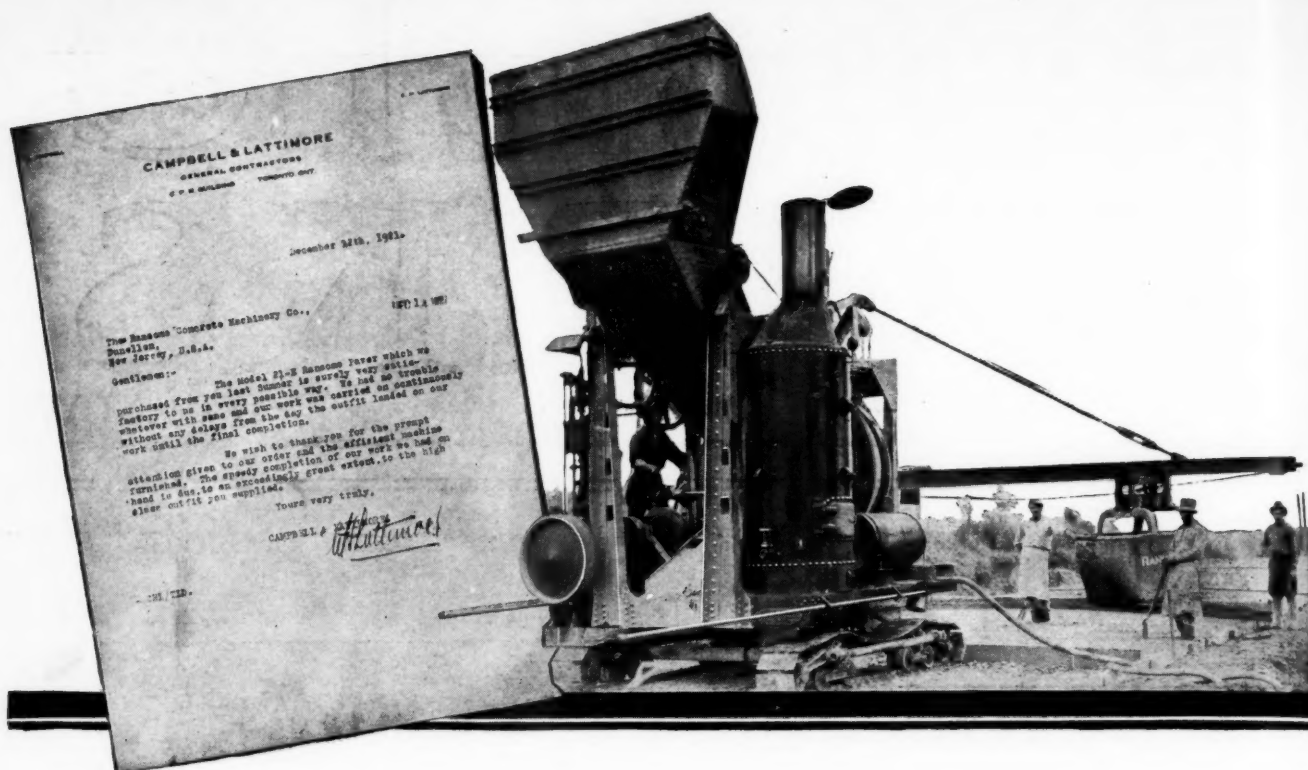
Paving on the Neenah—Oshkosh Road

Mixing and Placing 50,000 Yards of Concrete

Highway Maintenance Truck for Kern County

Blasting Drilled Wells

MARCH 4, 1922



“... work was carried on continuously without any delays.”

The paver that pays must show staying power as well as speed.

Mr. C. H. Lattimore's letter, reproduced on this page, proves conclusively, that the Ransome 21-E Latest Type Paver is not only a fast worker, but a paver that stays on the job.

The mechanical features of Ransome 21-E Paver construction—its ability to stand up day after day under continuous hard service—are explained in Bulletin 106. Write for copy.



31-221

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PUBLIC WORKS.

CITY

COUNTY

STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 52

March 4, 1922

No. 9

Activated Sludge Sewage Disposal Plant at Gastonia, N. C.

By Fred W. Simonds

Design and operation of a plant that contains some novel features. Sludge treated with sulphur dioxide and pressed.

There has just been completed and put into operation in Gastonia, North Carolina, an activated sludge sewage disposal plant of a novel and interesting design.

The plant was designed in 1918 but the war conditions delayed its construction until Sept. 27th, 1920, when a contract was signed and construction immediately started.

The plant was first put into operation Oct. 18th, 1921, for the purpose of building up a highly activated sludge of sufficient quality by a continuous circulation and aeration of a single dose of sewage. On December 14th, 1921, or about eight weeks later, the entire plant was in operation, including dewatering apparatus and sludge press.

The plant is located on a tract of about 80 acres owned by the city and located about two miles southerly from the center of town.

In general, it consists of four aerating tank units each 66 feet long, 8 feet 6 inches wide and an average of 11 feet 2 inches deep, and four settling basins each 30 feet long by 8 feet 6 inches wide and with a varying depth and a hopper at lower end as shown on the plans. The plant over all is 40 feet by 101 feet. Two 15-inch terra cotta main outfalls bring the raw sewage from town into a manhole near the plant. The level of the sewage as it comes into the collecting manhole alongside the plant is about six feet below the level of sewage as it is maintained in the plant. It is lifted by a simple form of air jet—a piece of 2 1-2-inch brass pipe about two feet long, capped at the bottom and with 1500 1-16-inch holes drilled through its side.

The sewage is lifted to a point about three feet above the top of the plant proper and passed down into and through the sides of two vertical bar basket screens 21 in. square and 28 in. deep. These screens are made up of galvanized iron cross arm

braces spaced 1/4-inch apart by ordinary galvanized iron washers and held together by means of 1-2-inch by 20-inch galvanized steel bolts. These baskets have no bottom but in place thereof are two 18-inch by 18-inch sluice gates laid horizontal and manually operated. When a screen becomes clogged, the operator diverts the sewage into the other screen, runs a wheelbarrow underneath the former, opens the sluice gate and the refuse drops down out of the basket into it. These screenings are then hauled away and buried.

The sewage flows from these screen baskets into a trough about 18 inches wide and averaging 20 inches deep. The trough extends all around the aerating tanks. At each end of each tank unit there are two 8-inch special outlet valves through the bottom of the trough by means of which sewage can be led into any or all of the tanks and they may be operated in series or parallel or as may be deemed best by the operator. These outlets being in the bottom of the trough preclude any possibility of putrescible matter lodging in the trough, as might occur with side outlets. These outlets can be closed by a disc properly fitting into the opening and with a D handle for lifting out.

In the bottom of each aerating tank there are two rows, longitudinally of the tank, of filtros plates, 448 being used in the entire plant. The containers for these are made of cast iron and hold four plates each. They are made in two horizontal sections and grouted and bolted together after the filtros plates have been placed therein. These special cast-iron containers were heated and dipped in hot asphalt and then the bottom section was lined with No. 22 gage aluminum plate properly shaped. Air pipes 1/2 inch to 4 inches in size lead air from an 8-inch air manifold running transversely of the plant into these cast iron containers below the filtros

plates. A bleeder line is also led from each container to the top of the plant, there terminating in an ordinary gas cock. These containers are laid end to end and grouted in place. Between the rows of plates and against the sides of the tank, ridges of concrete are formed so that any falling sewage is diverted to the surface of the plates. The filter plates are 12 by 12 by 1-2 inch Grade S plates, furnished by the General Filtration Company of Rochester, N. Y.

Air for the diffuser plates and for the air jets is furnished by Nash 6 "Hytor" air compressors furnished by the Nash Engineering Company of South Norwalk, Conn. These units are rated at 935 cubic feet of free air per minute against ten pounds pressure and are in duplicate.

When it becomes necessary for any reason to empty an aerating tank unit, the inlet trough valves are closed, excluding the sewage from this unit, and the air jet in the drain manhole is started, lifting all the sewage out of the tank into the pipe leading to the inlet manhole and thence through the other three units in regular form.

After sewage has been aerated and agitated in the aeration tanks, it passes through the bottom of the outlet troughs and into the troughs over the settling basin, from which it drops through special

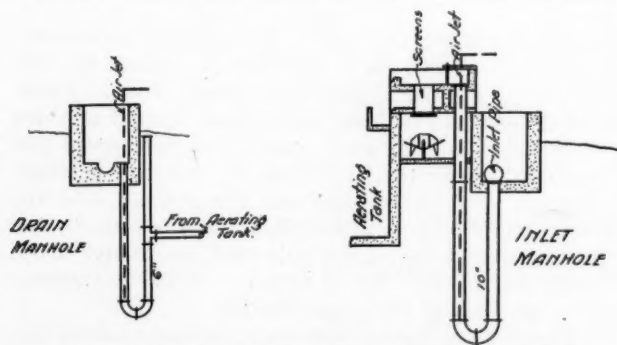
valves, similar to those in other troughs, into the settling basin, where the sludge slowly settles down. A large portion of this sludge settles at once into the hopper directly underneath. These hoppers are like an inverted pyramid 8 feet 6 inches square and 6 feet deep. The floor of the other portion of the tank has a slope of two feet toward the hopper. A traveling wood flight conveyor, as shown on sketch, made up of two link belt chains per unit and carrying wood flights, travels at the rate of six feet per minute along the floor of the basin toward the hopper thus acting as a squeegee to carry the sludge which has settled in this portion of the tank into the hopper.

The effluent of this tank passes in a thin film over brass weirs into the outlet trough and thence to the stream. This effluent is clear and carries no solids at all.

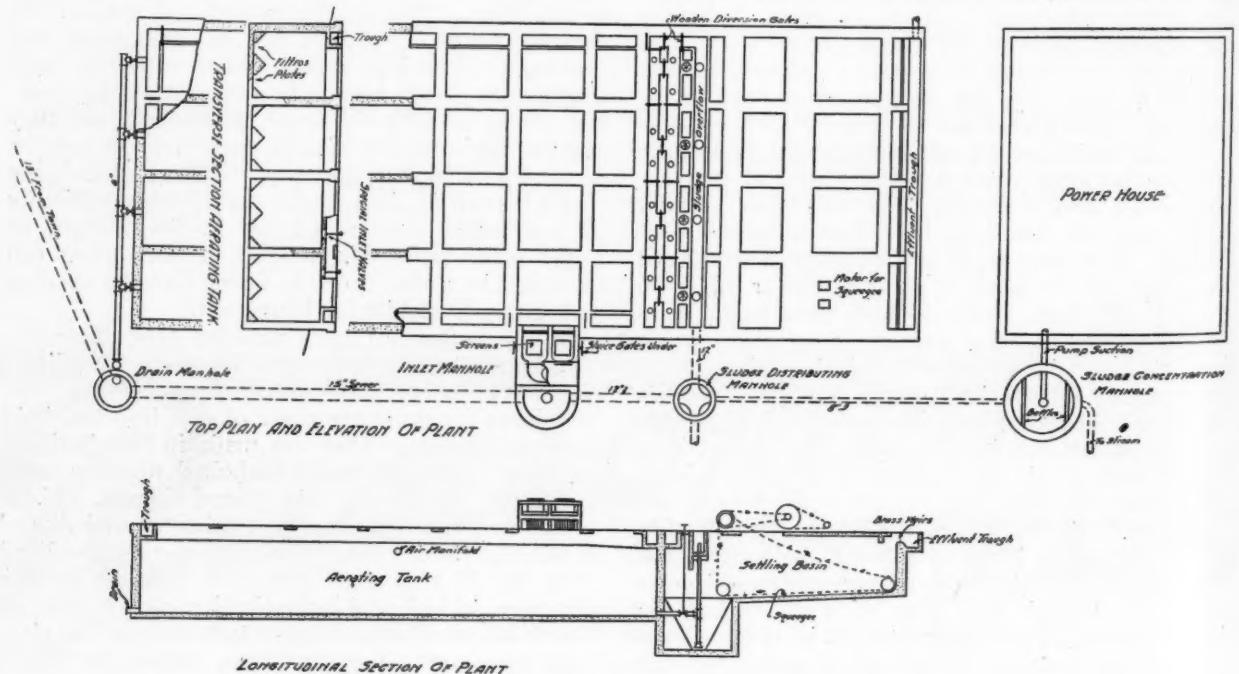
The sludge which has settled in the hoppers, being about 98 per cent water, rises through bell mouths and vertical riser pipes into the sludge overflow trough. The tops of these pipes are movable so that the top can be set at any desired height below the weirs at outlet for best results. This varies with quantity and quality of sludge being handled and is adjusted from time to time to get a good effluent and satisfactory sludge.

The sludge is led from this trough into a "sludge distributing manhole" outside the plant proper. This manhole is four feet in diameter and three feet deep and is for the purpose of distribution only. Part of the sludge is diverted back to the inlet manhole to go through the plant again, while part is taken to a sludge concentration manhole for pressing. An outlet is also provided in this manhole for leading sludge into a possible sludge drying bed in summer months.

At the present the best results are being obtained by holding down the sludge content of aerating tank to 35 per cent after 15 minutes settling of sample. This is obtained by taking frequent test



DETAILS OF DRAIN AND INLET MANHOLES.



PLAN AND SECTIONS OF ACTIVATED SLUDGE PLANT

samples and drawing out sufficient sludge into the concentration manhole to keep the proper ratio in the aerating tank and at the same time obtain a clear effluent. When this plan is properly carried out, no trouble has been experienced by the sludge turning septic.

The sludge that has been diverted into the concentration manhole (which is 8 feet in diameter and 14 feet deep) is here dewatered by forcing sulphur dioxide fumes through it by means of a Connersville blower from a sulphur burner, and after a few minutes' sedimentation additional sludge is admitted to the tank, forcing the supernatant clear liquid to overflow. The new mixture is again gased and the operation repeated until the tank is practically filled with thick sludge.

The process as above outlined is a modification of the MacLachlan process, which uses sulphur dioxide with steam, and was developed by the engineers with the co-operation of the MacLachlan Reduction Process Company, which furnished the equipment.

The sludge, after this treatment, is lifted from the tank by a Goulds 7x10 triplex plunger pump under pressure into a 40-plate 40-inch filter press of the old G. H. Bushnell type. A good cake is now being obtained, and tests will be made at once to develop a satisfactory control. After a pressing has been made, the plates are opened up and the sludge cake falls into a concrete trough beneath the press. In this trough there is a helical conveyor, operated by a motor connected to the shaft by a silent chain drive. This conveyor revolves at a speed of 48 revolutions per minute and carries the

cake through the walls of the building into carts outside and thence it is hauled away to other parts of the property and piled up. The conveying apparatus was furnished by the Carbondale Machinery Company of Carbondale, Pa.

The plant at the present time is handling about one million gallons of sewage daily and about 13,000 gals. of sludge is being drawn out for pressing daily, but the press is operated only on alternate days for a period of four hours for a complete operation.

The machinery is housed in a brick power house adjacent to the plant which is 27 feet by 37 feet inside. All machinery is motor driven and consists of the following:

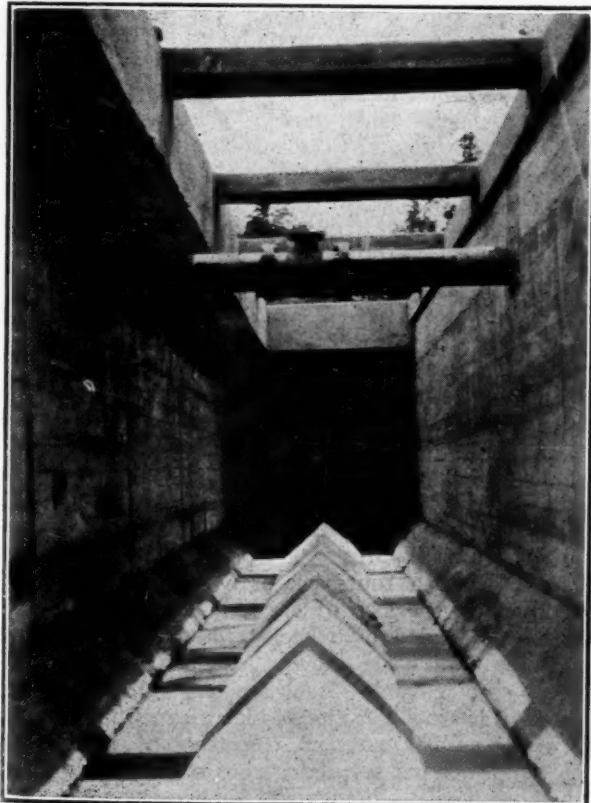
Two Nash air compressors direct connected to a 60 h. p. motor of the slip ring, variable speed type through a Turbo Gear of ratio 4.6 to 1 made by the Poole Engineering and Machinery Company.

One Goulds 7x10 triplex plunger pump direct connected to a 20 h. p. slip ring, variable speed motor.

One sulphur burner revolved by a 1-4 h. p. motor through gears.

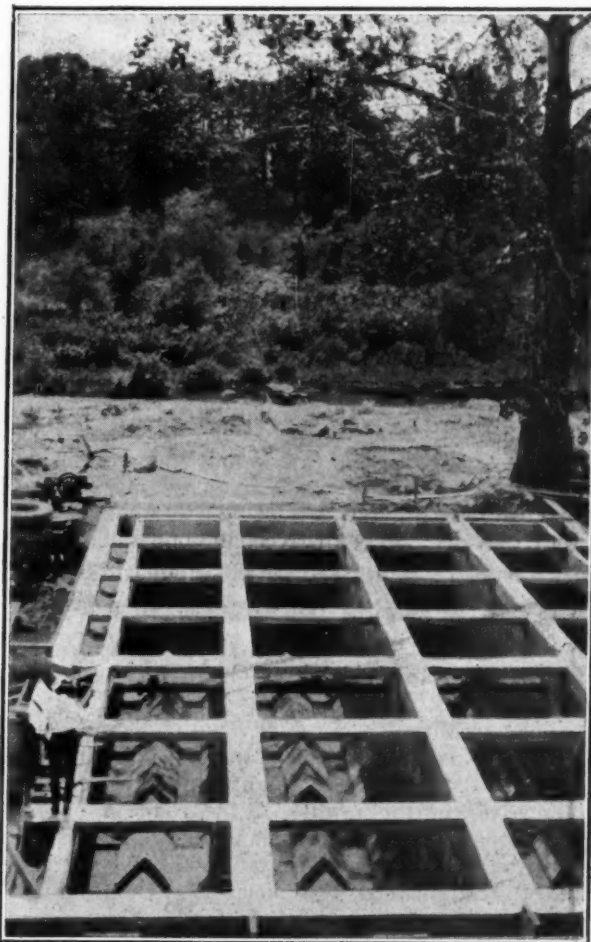
One Connersville blower for handling sulphur gas, belt-connected to a $7\frac{1}{2}$ h.p. motor. The sludge press also is located in this building.

One 1 1-2-inch Goulds centrifugal pump fur-



VIEW IN AERATING TANK

Shows ridges of concrete and recesses for filter plate containers. Above is 8-inch air manifold.



AERATING TANK, VIEWED FROM ROOF OF POWER HOUSE.

nishing 50 gallons per minute from a suction in the effluent channel for washing down tank walls, etc.

Outside of the power plant and on the top of the settling tanks is located the motive power for the operation of the link belt squeegee. This is furnished through link belt chains and sprockets by a 5 h. p. motor through a D. O. James speed reducer with an 80 to 1 ratio of reduction.

The plant was designed by William M. Piatt, consulting engineer of Durham N. C. Fred W. Simonds was resident engineer in charge of construction. B. W. Harris of Durham, N. C., was the contractor. The electrical work was installed by C. E. Rhyne, superintendent of public works in Gastonia, N. C.

The plant is owned and operated by the municipality, of which W. J. Alexander is city manager.

Paving on the Neenah-Oshkosh Road

A Wisconsin road built by county forces using standard apparatus. Prices using different methods of transporting materials.

The Neenah-Oshkosh Road in Winnebago county, Wisconsin, has aroused a great deal of interest because it was successfully carried on with county forces and with a relatively low investment in machinery. The progress of the work was very good considering the method of handling material to the mixer, the idea being not to revolutionize concrete production with new experiments and record runs, but to efficiently carry out the work with available men and equipment. The equipment is such that it is flexible enough to be used on any work in the county and at the present time there is a surplus of laboring men in that locality, who are afforded employment by road construction.

The season's work consisted of 7.45 miles of road built in two sections. The south section was 4.41 miles long, extending north from the city limits of Oshkosh; the other was 3.04 miles extending south from the city limits of Neenah, both joining last year's construction. Paving operations began May 31 and ended Sept. 17. The shouldering was completed about Oct. 15 and the entire road thrown open to travel. This completed the stretch of concrete road from Oshkosh to Green Bay, a distance of fifty miles.

The grading was done with teams, using No. 2½ Russell wheeled scrapers. The old gravel road crossed fairly level country and it was necessary to lower the profile of the road in order to get enough material for shoulders. The excavation was very light, averaging 2,660 cubic yards per mile. The Eastern Wisconsin Electric Company's interurban tracks paralleled the road. Arrangements were made with the company to haul materials to the highway. When the grading was done care was taken not to leave any excess material next to the

car tracks where it would interfere with dumping the aggregates on the subgrade. In these instances it added considerable to the cost of grading to move the earth to one side of the road and to move it back for shoulders after the pavement was completed.

The plans show reference stakes every hundred feet apart but a resident engineer set permanent stakes every twenty-five feet. These were set beyond the ditch line out of danger on each side of the road. The stakes were driven either to exact grade or to an even number of feet above or below grade, depending on the character of the cut or fill. When these stakes were set and properly marked, it was an easy matter to check the grade at any time by means of three sight sticks or Ts. One of these sticks was set on each stake and an adjustable T, set at the proper reading, was held at different points across the road. The fine grading was continued until the subgrade checked within a tenth of a foot at every point. By checking very closely at every twenty-five foot interval there was very little variation of the subgrade anywhere on the road. After the grade had been trimmed to proper shape, great care was taken not to put a crown in the roadbed when subsequent grading was done to fill the ruts.

The 4.41 mile section extending north from Oshkosh was favorably situated to ship material to a siding near the center of the job, from which the material was distributed by the interurban line. The aggregates were transferred by clam shell from the steam line car into twelve-yard dump cars. No stock piling was necessary, as the stock piling was done on the road. Only enough material was piled at the siding to load an emergency car for use at the mixer or to fill out a partially loaded car of sand or gravel.

The cement was hauled by flat car direct to the road. A small shed having a capacity of three cars stored enough cement for any emergency caused by a delay in shipments. An average agreement on demurrage afforded a good means of handling cement direct from the car and resulted in a saving both in handling and demurrage.

A mile of material was spotted before the paver started, so there was no delay after the paving crew was organized.

Two-inch wooden forms were used for side forms. The resident engineer set stakes every fifty feet on the line side for both the alignment and the grade of the top of the forms. The forms on this side were set about 200 feet in advance of the mixer. The other side was set as soon as the piles of material were removed.

The mixer, a five-sack Austin cube paver, was charged with a four-sack or a five-sack batch, depending on the size of crew at work. The mixer skip was loaded by wheelbarrows, two sets being used so that each wheeler dumped his load into every second batch. Each man loaded and wheeled his own barrow. An extra man cleaned up the piles. It was a simple matter to keep track of the wheelers by painting each set of barrows a different color so they were easily distinguished when they were with the wrong set of wheelers.

The finishing was done by hand, using a strike board to strike off and tamp the concrete and a belt

for final finishing. "Elastite" joint material was used every fifty feet. After the pavement had been struck off and before the final finishing was done, the joints were struck off with a six foot notched straight edge which was used in a manner similar to a split float. This one operation was very beneficial in insuring good riding joints. The pavement was covered with earth as soon as it had set sufficiently, and this covering was kept wet for two weeks before it was opened to traffic.

Paving operations on this 4.41 mile section began May 31 and ended July 28. During that time there were fifty days available for paving out of which the paver operated 47; one day's delay was due to rain, the other two were caused by a delay of the Eastern Wisconsin Electric Co. in lowering their tracks. The total amount of pavement laid in that time was 23,272 linear feet of 18 ft. one-course pavement, 7 inches thick on the sides and 8 inches in the center. The mix was in proportion of 1:2:3½. The average day's run was 495 linear feet, and the maximum day's run was 610 linear feet.

Four days were consumed moving to the North section, ten miles distant. Work was begun on this section August 3 and was finished September 17. The pavement was 18 ft. wide, as before, but the mix was 1:2:4. The total amount of pavement poured was 16,069 ft. The average run per day was 459 ft., the maximum 607 ft. Out of the 39 days available, the mixer operated 35. The four days delay were due to rain. There were a number of days when very little progress was made because of the small crew. It was difficult to maintain a full sized crew due to the long distance they were transported to and from work. This section which was 3.04 miles long was not so favorably situated along the interurban line and was for the most part a truck haul. A local stone quarry which was operated by county forces at a point near the center of the job supplied all the coarse aggregate for this section. The sand and cement were shipped to Neenah and hauled to the job by truck.

A comparison of costs between the two sections of this road is interesting in view of the fact that the materials on the south end were shipped to a siding, unloaded and hauled to the job by electric line, and the north end was principally a team or truck hauling proposition and a stone quarry was operated to furnish the coarse aggregate for it.

Summing up all expenses connected with the job, including depreciation of equipment, insurance, compensation, and interest on the investment, the cost per mile of the south section was \$26,315. (The records for the north section are not complete.) Paving alone cost \$2.10 a square yard on the south section and \$1.99 on the north. On the south section culverts cost \$19.65 per cubic yard; grading ahead of mixer cost 78.4 cents per cubic yard or \$2,066 per mile, and shouldering 49.9 cents per cubic yard or \$1,319 per mile.

The costs of the various items, for the south end and north end respectively were: Cement in place, 88.3 cents and 83.4 cents per sq. yd., or \$2.59 and \$2.55 per bbl. Fine aggregate in place, 27.5 cents and 25.9 cents per sq. yd., or \$2.63 and \$2.69 per cubic yard. Coarse aggregate in place, 55.5 cts. and 49.9 cts. per sq. yd., or \$3.06 and \$2.54 per cu. yd.

Joint material, 1.2 cts and 0.9 cts. per sq. yd. Mixing and placing, 23.4 cts. and 23.2 cts. per sq. yd. Water supply, 3.5 cts and 2.8 cts. per sq. yd. Sundry costs, 6.1 cts. and 11.4 cts. per sq. yd. Administration, 4.3 cts. and 1.8 cts. per sq. yd.

This is only one of five concrete jobs in the state carried on by day labor crews. Each job is carried on by county management and state supervision. Accurate and thorough cost data are kept of each project to offer a means of studying the relative costs and efficiency of different methods of construction.

Street Work in Toledo

During 1921 the street department of Toledo, Ohio, cleaned the streets by machine brooms, by hand patrol and by flushing. During the year 8 machine sweeping crews were in operation, giving from 10 to 40 cleanings annually to all streets that were on schedule for this kind of cleaning. During the year 29,150 loads were removed by the machine brooms. The hand patrol or white wings method of cleaning is used in the business district and also in residential sections where this class of service is requested. A daily average of 60 men and 5 teams were employed in this service.

In flushing the streets 8 crews operated day and night shifts. Owing to the heavy traffic in the business sections during the day, the streets in this section were flushed three nights a week during the summer months. Approximately 11,000,000 gallons of water were used for this purpose.

In cleaning alleys the department removed 20,187 loads of ashes and rubbish, which is about 15% more than in 1920.

In cleaning catch basins 10 men and 3 single rigs were employed and cleaned 3,000 catch basins during the year.

Of the streets of brick, stone, macadam, asphalt block and wood block, more than 140,000 square yards were repaired, while more than 700,000 square yards of cinder roads and other streets were repaired or patched, in addition to 57,469 square yards of asphalt repairs and resurfacing.

During the year 10,000 new street signs were put in place at a cost of \$7,940.

The city garbage was collected by the street department by city-owned teams and hauled to the disposal plant until the contract with that plant was discontinued, after which it was disposed of partly by being plowed under on farms and partly by hauling to the disposal plant. Thirty teams and wagons were used with an average of 60 drivers and helpers and 3 foremen. Dead animals, with the exception of horses and other large animals, were collected by a Chevrolet truck, 3,713 dead animals being collected during the year. The garbage collection totaled 11,843 loads estimated at 2 tons per load.

The department maintains 94 horses and mules for street cleaning and repair and garbage collection, and employed a foreman and 12 men for taking care of these animals and doing the necessary work at the barn and stable. There are also employed a horseshoer, a blacksmith and two help-

ers, a wagonmaker, two carpenters, two painters and three men with a single rig and horse who make all necessary repairs to pumps and water troughs in the city. Last year the 180 city pumps were repaired 697 times. The blacksmith, carpenters and painters do all the rebuilding and repairing work on the wagons, street sprinklers, flushers, white wing carts and other vehicles, tools and implements.

Cube Mixers

In an article which appeared a few weeks ago in PUBLIC WORKS it was stated that cube mixers were not charged or discharged while in motion, but were stopped for each of these operations. This statement was noticed by an official of the company that manufactures the Austin cube mixer and he has written to inform us that as a matter of fact there is no necessity for stopping or slowing up the mixer made by them for either charging or discharging. The operation of this mixer may be described as follows:

The cube hopper and the ring gear fastened to it, together with the discharging spout and the charging hopper, are all mounted on a tilting frame. The cube revolves in this frame and the discharge spout is permanently attached to and revolves with it. The charging hopper, however, is attached to the frame and does not revolve. An opening in one end of the cube, concentric with the axis of revolution of the cube, is directly opposite an opening in the charging hopper, the cube and the hopper at this opening being continually in contact throughout the circumference, so that all material placed in the hopper passes through the opening into the cube. It can be seen that the discharge of the hopper into the cube is not affected by any motion of the cube, either revolving on its axis or moving as the tilting frame is tilted. Only two revolutions occupying from 6 to 8 seconds are required to discharge the entire batch.

Before the cube is tilted, the direction of travel

of the batch is always toward and past the center line in a zigzag course, from one plane of the cube to the other. After the tilting of the cube, the direction of travel of the batch is always toward and through the discharge aperture, each of the cube's planes being tilted in that direction as the cube revolves. The illustration shows a small cube in the tilted position with the driving pinion and ring gear in mesh.

Highway Maintenance Truck for Kern County

By Charles W. Geiger

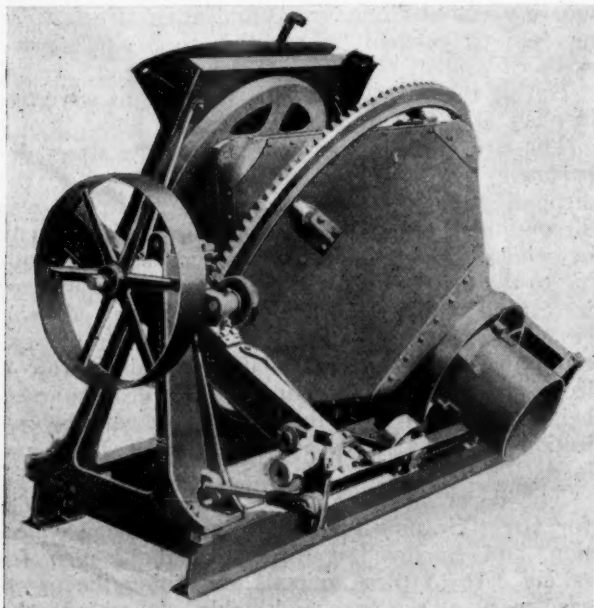
Carries very complete equipment for road maintenance work.

The accompanying photos show a novel highway maintenance truck recently placed in operation by the Board of Supervisors of Kern county, Calif., for general road maintenance and other highway work on road district No. 4.

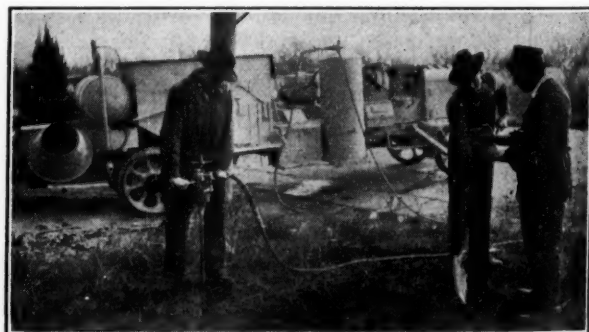
Stanley Able, chairman of the Board of Supervisors of Kern county, was partly responsible for the development of this idea, which was developed and the truck designed and built by the Fageol Motors Company of Oakland, Calif. Following is a description of the equipment:

Chassis: Fageol heavy duty, fitted with 4-cylinder, $4\frac{1}{2}$ in.x $6\frac{1}{4}$ in. motor, S. A. E. rating 32.4 H. P., actual 45 H. P. at 1,000 r.p.m.

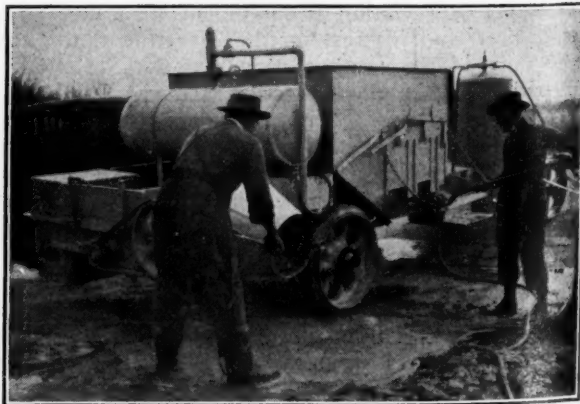
Equipment: (1) Cab, windshield, and storm curtains; (2) air compressor Rix. 6 in.x6 in. twin cylinder, oper-



CUBE MIXER TILTED FOR DUMPING.



USING POST-HOLE AUGER.

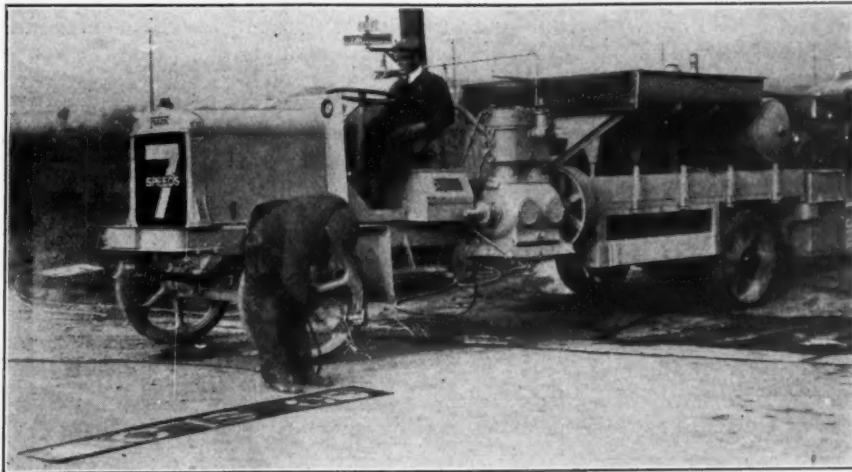


MIXING AND PLACING CONCRETE.

ated by belt from forward drive shaft, capacity 80-cu. ft. per minute; (3) large air receiver fitted with safety valve, gauge, hose connection; (4) 200 feet 1-in. air hose and connections; (5) combination material bins, capacity 1,000 lbs. cement, 1 cu. yd. sand, 2 cu. yds. gravel or rock, gravity feed from all bins, controlled by hand operated gates, to mixing apron; (6) water tank, capacity 150 gallons, contents can be withdrawn by gravity or under pressure; (7) rotary concrete mixer driven by auxiliary shaft from transmission; (8) centrifugal pump with self-priming device and suction hose for filling water tank from wells, rivers, etc.—this can also be used to good advantage in pumping out caissons in sewer or bridge construction, relieving flooded highways, and for other uses; (9) draw bar attachment for hauling trailers; (10) power driven nigger-head winch; (11) tar or road oil heating tank with gas burners, capacity 50 gallons; (12) Syphon nozzle for spraying hot tar or oil under pressure, with hose; (13) complete paint spray outfit, with hose and connections; (14) large pneumatic jack hammer, with assorted chisels, tampers, etc.; (15) pneumatic rotary post hole digger and hose; (16) extension side arm or boom from front end of truck for grading, etc.; (17) large grading plow to be pulled by side arm; (18) drag or grader for shouldering up; (19) steel wheelbarrow; (20) one ten-ton jack and bracket for same; (21) 200 feet 1-in. Manila rope; (22) 25 feet tow chain; (23) steel stencil for lettering highways; (24) hand tools—three shovels, two picks, one large sledge, two crow-bars, etc.; (25) ten red lanterns, ten "at work" signs, ten red flags.

The work that this outfit is designed to perform comprises:

1. Repairing ruptures or breaks in reinforced or

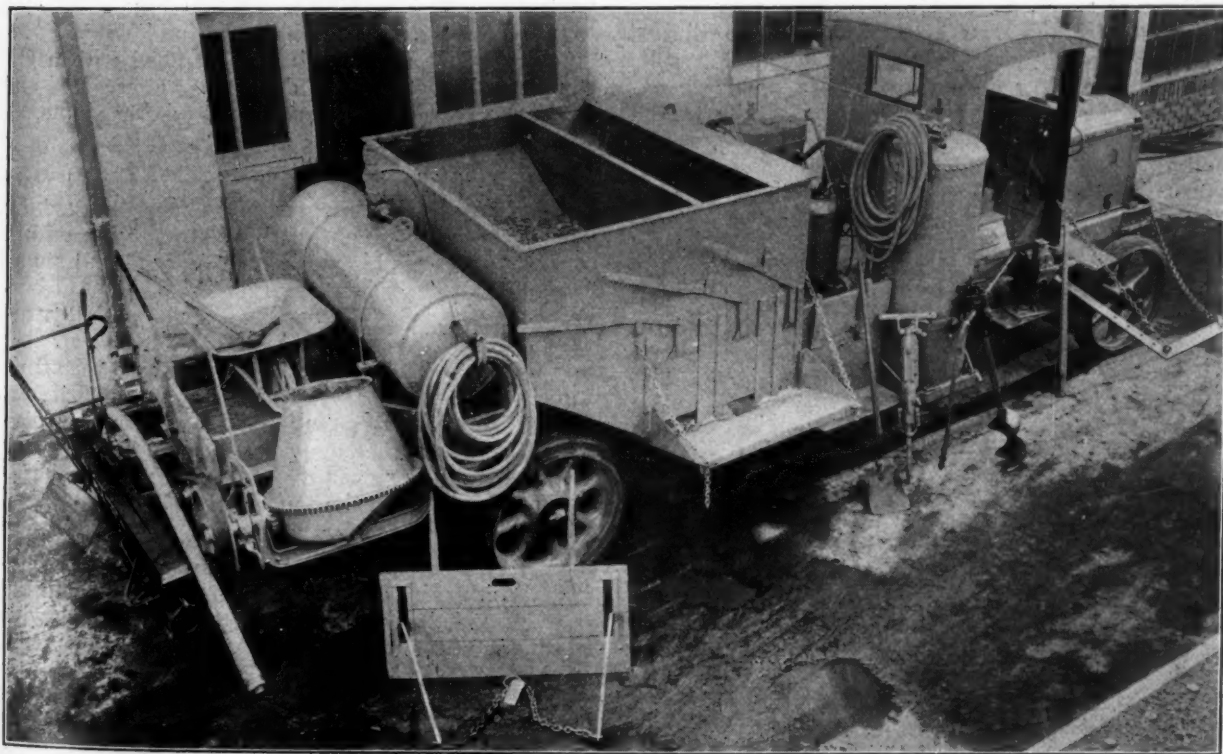


STENCILING TRAFFIC SIGN ON PAVEMENT.

plain concrete, macadam or other forms of streets, highways or roads. Using pneumatic jackhammers to break up the damaged places, pneumatic air jet to blow out refuse materials from material bins, mixing same in power-driven concrete mixer, spreading tar or surface oil over new work.

2. Erecting fences along highways or erecting county or traffic signs. Using pneumatic post-hole digger, materials and concrete mixer to set in concrete, tamping tool, paint spray outfit for painting or waterproofing. Side arm can be used for stretching wire. Wooden fences on grades or dangerous curves can be painted with spray outfit.

3. Erecting or repairing steel, wooden or concrete bridges or culverts. Using drawbar attachment to haul materials on trailers. Removing old



GENERAL VIEW OF MAINTENANCE TRUCK.

paint, rust, etc., from steel work with sand blast outfit and repainting with paint spray equipment. Heating and driving rivets with rivet heater and pneumatic guns. Cutting or welding damaged steel work or metal culverts with oxy-acetylene outfit.

4. Beveling, grading, shouldering up, rolling or draining right of way along highways can be done by use of the grading plow attached to the extension side arm, also using the grader and steel roller tire on rear wheel.

5. Stenciling traffic or ordinance signs on streets or highways, using the special steel stencils made for that purpose, with the spray outfit.

6. Chipping out cracks on concrete highways with chipping gun and sealing the openings with hot tar through pressure nozzle.

7. Cutting asphalt pavement with pneumatic

chisels or jackhammer when excavating for sewer pipes, underground conduits, etc. Excavations can be properly tamped by tools provided and surface of street covered with asphaltum and rolled. Tar tank can be used to keep asphaltum hot.

8. Spraying trees and shrubbery in parks, streets and along highways, using water tank filled with fungicide and high-pressure fog guns with air hose.

9. Putting out fires along highways, especially grain fires, which burn down fencing, using tank filled with chemical and high pressure through special nozzle. Speed of this unit in overgear makes it practical as an auxiliary fire-fighting apparatus.

A few weeks ago a demonstration was made at the Pittsburgh test highway, where repairs were made to the concrete track.

Mixing and Placing 50,000 Yards of Concrete

Aggregate delivered to elevated storage bins by belt and bucket conveyors, mixed in two separate plants, hoisted, rehoisted and spouted a maximum distance of 610 feet, covering 15 acres of construction area.

The selection, arrangement and installation of a large equipment of high-class concrete plant for the construction of an unusually large factory unit for the Fisher Body Ohio Co., Cleveland, by the Thompson-Starrett Co., New York, enabled a great quantity of urgent construction to be done with unusual rapidity under adverse conditions. The very liberal provision of high-class equipment and the skillful methods, arrangements and operations secured results that were considered to fully justify the large expenditure by the prompt completion of the urgent work within the specified time with a great reduction of hand labor and with a high percentage of salvage to be credited to the job on the completion of the work. Interest charges, heavy overhead expenses, and the possibility of complications and delays were all minimized by the policy pursued. Although the results were obtained in building construction, the principle governing the work and the important features of the plant and operations are of general interest on account of their applicability in large part, or through modification and combinations, to many large construction jobs, such as power houses, dams, filter plants, reservoirs and the like.

The work involved the mixing and placing of 50,000 yards of concrete in heavy foundations, walls, columns and floor slabs, occupying a 15-acre area with maximum dimensions of 1150x710 feet, which notwithstanding unexpected delays and unusual difficulties was accomplished within the limited specified time, about 95 percent of the concrete being placed in one hundred days.

The main building consisted of a six-story 1150x72 foot portion with one two-story 710x302-foot wing, and one one-story 462x253-foot wing, besides which there was a 96x115-foot power house.

SPECIAL CAR EQUIPMENT

After the contract had been signed great difficulty was experienced in securing railroad cars for transporting cement and aggregate and many other contractors in this region were subjected to very long delays; but the Thompson-Starrett Co., in order to execute the work within the specified time, proceeded to purchase outright 25 box cars and 48 100,000-pound gondola cars which they handled with a 60-ton leased locomotive, delivering aggregate and cement to two independent central mixing plants.

HANDLING AGGREGATE

At one of these plants the stone and sand were dumped into track hoppers and thence hoisted by bucket conveyors to an overhead storage bin with a capacity of 250 cubic yards each of sand and stone. The other mixing plant was served by overhead bins with a capacity for 125 yards of sand and 250 yards of stone, which were filled by a belt conveyor 350 feet long and 24 inches wide that delivered sand or stone at the rate of 300 tons per hour, unloading a car in 10 or 11 minutes; the same conveyor also handled the cement bags, distributing the different materials to their respective bins by means of a three-way arrangement at the top of the belt.

MIXING AND DISTRIBUTING CONCRETE

Each of the mixing plants was equipped with a one-yard Smith mixer, electrically driven. The mixers were provided with power tilting devices and with automatic water measuring tanks. At each plant the mixing machine delivered to a bucket of 36-cubic feet capacity which was hoisted by a 100 h.p. single-drum electric Lidgerwood or Thomas machine having a capacity of 6,000 pounds on a single line and a speed of 400 feet per minute. The hoist buckets

were dumped into either of two receiving hoppers of 54-cubic feet capacity which were set at different heights in Insley steel towers, the tower for the No. 1 mixer being 160 feet high and that for the No. 2 mixer being 200 feet.

The No. 1 mixer distributed concrete over a radius of about 130 feet by means of a counterweighted truss and chute and also spouted concrete through chutes 260, 280 and 350 feet in length to the bottoms of steel relay towers respectively 150 feet, 160 feet and 80 feet in height, whence the concrete was distributed by standard Insley quickshift counterweight chute, boom plant and tripod equipments, with 130-foot pouring radius. The No. 2 plant delivered from the hoisting tower through the 290-foot chute to a loading hopper and through two 400-foot chutes to the bottom of relay towers, each 160 feet high, which like the main hoisting tower, were each provided with a counterweight chute and boom plant, giving a 130-foot pouring radius with no intermediate support except a light tripod suspended from the point of the counterweight chute. This installation handled concrete through an extreme construction distance of 2,500 feet and placed 38,000 yards of concrete in addition to 12,000 yards that were mixed by two 1/2-yard portable machines, used chiefly for preliminary foundation work.*

The record output for one day for the two large machines was 1,065 cubic yards of concrete mixed in 17 hours, one machine being operated 9 hours and other 8 hours and producing an average of more than 61 yards of concrete per machine per hour. The greatest distance to which the concrete was spouted from the mixer was about 610 feet horizontally. A force of 16 men spreading and placing concrete at the end of each chute placed a maximum of 360 linear feet of floor 72 feet wide in one day and both plants operating together concreted one complete story in eight days.

MATERIALS AND EQUIPMENT

The form lumber was cut with six portable gas-line-driven saw rigs, and 50 carpenters were employed in making and shifting the two sets of forms. The aggregate was handled, concrete mixed and distributed by a total force of about 60 men, including 12 who were unloading and handling cement.

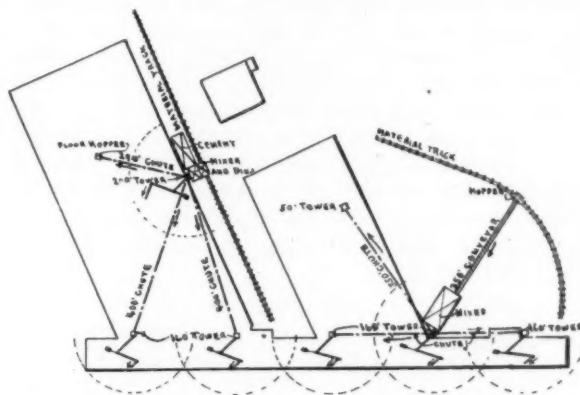
The concrete was reinforced with about 3,000 tons of steel rods bent at the site and hoisted by self unloading apparatus. The work required about 400,000 cement bags, which were emptied by hand, shaken by electrically driven rotary machines and were baled in two Faerberhill bag bundling machines. The total

*These towers are shown in the illustration on the front cover.



UNLOADING CRUSHED STONE TO STORAGE PILE

cost of the construction work was about \$4,000,000, the concrete work forming about 25 percent of the whole cost. The maximum force employed was 1,800 men. The maximum force of carpenters employed



LOCATION OF HOISTING AND REHOISTING TOWERS AND CHUTES

at any one time was 275. Besides the hoisting engines in the steel concrete towers, seven other hoisting engines were installed to operate the brick and steel elevators and a total of 1,650 electric h.p. was installed to operate the different construction machines.

A graphic record of progress was kept. On diagram plans the areas backfilled and leveled were indicated by dotted outlines, excavated areas by solid outlines, forms started by rectangles with one diagonal, forms completed by rectangles with two diagonals, concreted mats by single hatched areas, and completed concrete footings, walls and floors by solid black areas. These diagrams were posted daily and enabled the condition and progress of any portion of the work to be instantly determined by inspection.

Typhoid Attributed to Fish and Shell Fish

Dr. W. H. Hamer, medical officer of health to London county, England, is the author of two articles which have recently appeared, one in the annual report of the London county council and the other in "Public Health" for December 1921, in both of which he discusses at some length the typhoid fever statistics for London. In the report he states that he does not believe present available data in both England and the United States



STORAGE FOR AGGREGATES AND CEMENT HOUSE

warrant the belief that preventive inoculation has caused a lower incidence upon young men during the war, and further that London experience for 25 years past furnishes no clear evidence of the spread of typhoid due to direct case-to-case infection. From a review of the London outbreaks, which he discusses at some length and especially the epidemiologic data, he inclines to the belief that fish and shell fish have been responsible for the greater part of the typhoid outbreaks in London during the past 25 years and that the continued and accelerated fall of typhoid in London is to be attributed mainly to the improved conditions surrounding the supplies of fish and shell fish furnished to that city.

Competitive Plans for "Moving Platform" Transportation

The City of Paris is inviting inventors to submit plans for a "mechanical system of continuously operating conveyance for passengers." No special route is designated, but the general design only will be considered. The inventors must, however, give suggestions as to arrangement of stations, elevator, escalators, connections with the existing subway, etc.

Three prizes are offered—100,000 francs, 50,000 francs and 30,000 francs. The jury will be free to award these separately or combined.

The plans will remain the property of the inventors and the city does not guarantee to carry them out. If, however, the city should decide to construct such a system, it can, if no other arrangement is made with the inventor, acquire full ownership for 500,000 francs.

The competition is open to all until September 20th, 1922, at 6 p. m. Competitors must make a deposit of 100 francs, which will be returned to those who satisfy the conditions of the competition.

For further information, address "Service Technique du Metropolitain, 48 Rue de Rivoli, Paris, France."

New York-New Jersey Tunnel

The second bidding for the river section of the vehicular tunnel from New York to Jersey City resulted February 15 in the award of three contracts aggregating \$19,250,000 to Booth & Flynn, who expect to begin work quickly and complete it within 36 months. The bid was made in competition with two others, one for \$1,410,000 more than the successful bid and one for \$22,291,000, presented by the P. McGovern Co., Inc., and by Holbrook, Cabot & Rollins, associated with the Keystone State Engineering Co., respectively.

The successful bidder gives a surety bond of about \$4,000,000, a requirement that caused some difficulty at the previous bidding for the same work when the present successful bidders submitted a bid \$500,000 greater than their last bid. The difference in the last bidding between the highest and lowest bid amounted to only about 15 per cent. and the results of the letting are considered very satisfactory by the officials, in that it secured bids from three experienced firms of high standing and obtained a figure much smaller than had been previously offered

and considerably below the official estimate of cost, a fact that is probably due to confidence in the continued decrease of labor and material cost, which have fallen materially since the first estimates were made.

The work will be done by the compressed air and shield method with cast iron lining, similar to that employed for the Rapid Transit and Pennsylvania Railroad tunnels already built under the East and North rivers.

The contract is said to be the largest ever entered into by the State of New York and covers the larger part of the vehicular scheme, which with its shaft and approaches will, it is now expected, be built within the estimates of \$28,669,000.

The contractor, who is now completing the large twin Liberty tunnel in Pittsburgh, previously built six subway tunnels under the East river, the last of these contracts being for four tubes, aggregating \$12,500,000.

Brooklyn-Richmond Freight and Passenger Tunnels

In a recent communication to the mayor of New York, the chief engineer of the Board of Estimate and Apportionment, the Commissioners of Docks and of Plants and Structure, and the engineer of the Borough of Richmond transmitted a report of consulting engineer W. J. Wilgus as a review of the subject from every angle and as setting forth the status of the project at the present time.

Mr. Wilgus treated the subject under the heads of: necessity of a meeting; authority for comprehensive plans of the meeting; the Narrows Tunnel preferable to the Port Authority plan; estimated saving; and justifiability of the project. From these investigations he concluded that there is a crying need for relief from the present method of freight transportation between the trunk lines and the eastern shore of the harbor of New York.

There are in existence two New York State laws to provide that this relief shall be given, one through the agency of the New York Port Authority and the other through the instrumentality of the Board of Estimate and Apportionment of the City of New York, which is required to build a freight and passenger tunnel beneath the Narrows, between the Boroughs of Richmond and Brooklyn.

He concluded that the preferable solution of the problem affording relief under these two laws is that under the provision of the Narrows tunnel act, which minimizes fixed charges, avoids centers of congestion in New Jersey, obviates grade crossings of water and rail traffic and draw bridges, has very moderate gradients on steam operated sections, provides a clearing yard for classification of cars, minimizes traffic development of adjoining territory and leads mainline traffic to the Borough of Richmond, where the best of service could be afforded by great ocean piers on the North Shore and on Arthur Kill. That the immediate construction of the Narrows tunnel is justified, and that the carriers jointly should negotiate with the city of New York as to the terms under which the Narrows tunnel plan may be made effective.

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CONTENTS

| | |
|--|-----|
| ACTIVATED SLUDGE SEWAGE DISPOSAL PLANT AT GASTONIA, N. C. Illustrated. By Fred W. Simonds..... | 153 |
| PAVING ON THE NEENAH-OSHKOSH ROAD.. | 156 |
| Street Work in Toledo..... | 157 |
| Cube Mixers. Illustrated..... | 158 |
| HIGHWAY MAINTENANCE TRUCK FOR KERN COUNTY. Illustrated. By Charles W. Geiger.... | 158 |
| MIXING AND PLACING 50,000 YARDS OF CONCRETE. Illustrated..... | 160 |
| Typhoid Attributed to Fish and Shellfish..... | 161 |
| Competitive Plans for Moving Platform Transportation | 162 |
| New York-New Jersey Tunnel..... | 162 |
| Brooklyn-Richmond Freight and Passenger Tunnels.. | 162 |
| EDITORIAL NOTES | 163 |
| A Small Activated Sludge Plant—Shellfish and Typhoid—Disproportionate Material and Transportation Costs..... | 164 |
| Water Users vs. Taxpayers..... | 164 |
| BLASTING DRILLED WELLS. Illustrated..... | 164 |
| Evils of Surety Bonding Systems..... | 166 |
| Methods of Paying for Paving. Table..... | 167 |
| RECENT LEGAL DECISIONS..... | 169 |

A Small Activated Sludge Plant

A city of 15,000 or less population in North Carolina has recently put into service an activated sludge plant which contains not only the air compressing and pumping machinery required for supplying air and returning the activated sludge, but also a sulphur burner and a blower for applying sulphur dioxide to the sludge and a sludge press for reducing the water content, and a motor-operated appliance for forcing the sludge to the outlets of the settling tanks. This plant is described in this issue.

Such abundant provision of machinery is found in a number of the larger sewage treatment plants, but is uncommon in those with a capacity of only two million gallons a day. In fact, some engineers would consider that the activated sludge process, with its requirement of machinery and constant attention, is suitable only for large cities. Apparently the engineers and others in charge of Gastonia's public works believe that added efficiency and saving in labor can be secured by this mechanism which make it worth while.

The sludge cake produced is quite firm and can be handled in quite large pieces. Whether the farmers will take it for fertilizer or it will be used for filling low land remains to be seen. The plant

has been operating completely only about two months and the adjustment of the various operations to the most satisfactory operation of the plant as a whole is still being studied by the engineers. At present only about thirteen thousand gallons of sludge is drawn out daily for pressing and the press is operated only about an average of two hours a day. The plant is located a mile or more outside the city limits on an eighty-acre tract owned by the city, and presumably the disposal of the sludge will not present a very serious problem for some years, even if the sludge is not utilized for fertilizing purposes.

Because of the several novel features of this plant, engineers will follow its future operations and development with a great deal of interest.

Shellfish and Typhoid

For years students of typhoid epidemiology have felt quite sure that a certain amount of typhoid fever was due to oysters and other shellfish that had spent some time in sewage-polluted water. It is generally considered, however, that the number of cases attributable to this cause is relatively small.

It therefore arouses some interest to learn that the medical health officer of London announces his belief that the greater part of the typhoid outbreaks in London during the past twenty-five years have been due to fish and shellfish. Oysters are not the chief form of shellfish consumed in England, as they are in this country, but the general chain of acts and conditions connected with the securing, handling, selling and consumption of the various kinds of shellfish are presumably similar in both countries.

Certainly a similar conclusion could not be arrived at in this country. To cite only one proof to the contrary, the filtering of water supplies has been followed so invariably and immediately by a reduction of 50 to 90 per cent. in the typhoid death rate that there can be no escaping the conclusion that a very large part of the typhoid in this country in past years has been due to polluted water.

With water largely eliminated by purification, however, sanitarians can concentrate their investigation upon other causes, and in doing so will undoubtedly give due attention to oysters and other shell fish.

Disproportionate Material and Transportation Costs

Although the unit cost of highway construction in the state of Kentucky has been steadily falling as shown by the successive lower prices in recent bids, the highway commissioners of that state believe it still to be much too high and are determined to bring it down still lower.

At a very recent conference of the highway commissioners with the officers of the Kentucky Association of Highway Contractors, the latter demonstrated that common labor has taken its cut and is the largest contributor to reduced highway costs; that the contractor comes next by the elimination of his legitimate profit; and that reductions in the cost of materials have been at best very small and in some cases even negative, and that railroad transportation costs are enormous and entirely disproportionate.

ate, generally equalling, in the case of crushed stone, the whole cost of the material F. O. B. cars, and in some cases it equals that cost plus the cost of transportation before the war. Their conclusion therefore is that further reductions, which the public is entitled to in highway costs, must come from material interests and the railroads, that the laborer can only just live on his present wage, and that the contractor can quote no lower prices under present conditions unless he pays the state for the privilege of doing the work.

It is believed that the remedy lies with the state, that any reduction in the present costs will be reflected in lower bids, that the aggregate profits of the contractor would be in direct ratio to the reduction in cost, no increase in the percentage of profits being intended.

This has resulted in the highway commission arranging for conference with the railroad commission, the railroad committee of the senate, and the common carriers committee in the house of representatives, at which it was shown by the highway commissioners that the state is the sufferer from excessive transportation charges and that senate bill 66, intended to facilitate the revision of transportation charges should be warmly supported.

There is little doubt that the conditions described in Kentucky may be reflected more or less in some other states and that strong action of contractors and the general public should be taken to educate individuals and corporations to the necessity of promptly abandoning this unfair and wholly unjustifiable effort to maintain war prices in the face of the reductions already accepted by other interests and the universal public suffering occasioned by the continued profiteering.

In this time of worldwide reconstruction, economy, efficiency and industry should be multiplied, not divided. An obvious measure for the reduction of excessive transportation costs is the extension of motor truck and trailer service and the location, development and operation of local sand pits and quarries. The latter may be and should be efficiently supplemented by the action of the state and federal authorities in making mineral surveys and of the highway departments in locating available deposits, testing them, and advising contractors of their probable availability. At the same time laboratory and field research should be combined with engineering study to provide satisfactory combinations of material and to revise specifications to permit the widest applications of local supplies and the selection of material in accordance with local needs and conditions. Considerable work on these lines has already been done in Pennsylvania and in other states and should be universally emulated.

Water Users vs. Taxpayers

Editor PUBLIC WORKS,
New York City:

In a recent editorial on "Water Users vs. Taxpayers," you ask if it is legal, just or good business to use money paid for water, to construct or maintain other enterprises of the city.

To understand this question, it is better to consider the whole transaction.

To begin, the water department, (or the city for it) issues bonds to furnish capital to construct the works, agreeing to collect sufficient in water rates to pay the interest and maintain the works in good running order. The value of the works is thus the capital, and fixes the value of the bonds; the works being mortgaged to the bondholders. No other enterprise the city may enter into, as streets, parks, etc., is responsible for the payment of these water bonds.

Now, where does the money come from to manage and maintain the works? The water department or city makes a contract with certain individuals, (not with taxpayers), we call them water users, to furnish them a certain definite commodity, at an agreed fixed price per unit. The commodity which the water taker agrees to pay for is WATER and the only thing the city agrees to sell is WATER. There is no agreement on the one part to furnish streets, parks or charity or on the other to pay for them.

If the water user chances to be a taxpayer also he is taxed twice for any city undertaking, outside the water system, which he is compelled to contribute to.

It would seem therefore to pay for any benefit, shared by the whole, by moneys derived from a part of the people, is unjust and therefore illegal and unbusinesslike.

This is well recognized by Public Service commissions, and with that in mind, they demand that the accounts be kept so as to separate the service to the public from the service to the individual.

This subject is worthy of the attention of engineers because of its close relation to efficient management.

Walter H. Richards

Retired Engineer, Water and Sewer Dept., New London, Conn.

Blasting Drilled Wells*

Methods of blasting water wells and conditions under which blasting is desirable.

Within recent years explosives have come into use for increasing the flow of drilled water wells. The method of blasting drilled water wells are much the same as those employed in the oil fields, but the desirability of blasting such a well should first be determined by careful study of its location, its drilling record, and the water supply it is designed to draw upon. Whether it is safe to blast depends largely upon the proximity to buildings and the depth of the well. If the well is in a city close to or within large buildings, it may be dangerous to blast, lest the shattering of the rock underground weaken the foundations of the buildings, or flying fragments of rock do damage above ground. If the well is shallow, any risk there may be of injury to surrounding property is increased. However, wells within a few feet of houses have been blasted without the slightest damage and it is probably safe to say that if the size of

*Excerpted from Du Pont Magazine, Nov.-Dec., 1921.

the charge is proportioned to the depth of the well and the work is carefully done, blasting can be carried out in most places with little risk.

DESIRABILITY OF BLASTING

Whether it will be profitable to blast a drilled water well depends upon the quantity of water in the earth or rock surrounding the borehole, and the character of the formation.

The greater part of the rainfall seeps downward into deeper layers of soil or rock, often completely saturating them. The water in this saturated zone is called the ground water and is the great source of supply for lakes, spring and wells. It is in constant movement from higher to lower levels, flowing evenly through layers of sand or gravel confined by relatively impervious strata, or in rock strata, trickling through the pores of the rock and along joint cracks, bedding planes, solution channels and other crevices. It is, of course, to this ground water that wells are drilled. The United States Geological Survey has made studies of underground water supply in most sections of the country and can furnish maps and other information concerning the depth, abundance and composition of underground waters and the character of both the water-bearing strata and the strata between them and the surface which will be found of great value alike in selecting the well location and drilling the hole and in blasting to increase the flow of water.

Firing a blast at the bottom of a well in sand or gravel would have practically no effect on the flow of the well; the sand or gravel would simply settle back after the explosion into its original place in the porous mass.

If sunk into water-bearing rock, however, a well may draw only from the particular pores or crevices which it intersects and their tributary pores and fissures, and thus secure only a relatively small portion of the water carried by the whole stratum at that point. If passages could be opened into the borehole from the whole area of the surrounding rock, the flow of the well would be immediately increased. Here, therefore, is the function of explosives, for a heavy charge fired at the bottom of the well would increase the sectional area of the hole, making a collecting cavity for water, and would open up radiating fissures throughout a considerable area of the enclosing rock.

BLASTING METHODS

The methods of blasting drilled water wells are derived directly from oil-well shooting. The explosive is usually placed at the bottom of the hole. It sometimes happens that a hole is drilled through a water-bearing area into a lower dry area and in such a case the shot should be fired, not at the bottom of the well, but at the level of the water-bearing rock.

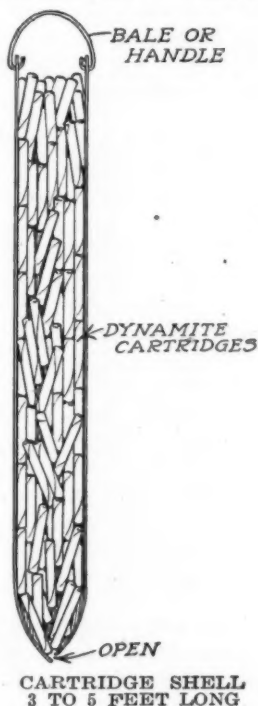
It is advisable to use a quick, powerful explosive and a heavy charge. The best explosive for the purpose is probably Du Pont Solidified Nitroglycerin, but, if this is not obtainable locally, Du Pont 60 per cent Straight Dynamite will also do satisfactory work, provided the column of water which may be standing in the well is not over 200 feet high. The exact size of the charge is governed by the depth of the well, the nature of the rock to be blasted, and the

proximity to buildings. For a well 100 feet deep, an efficient and safe charge would be from 100 to 200 pounds of Solidified Nitroglycerin or from 150 to 300 pounds of 60 per cent Straight Dynamite. For every additional 100 feet this loading could be increased by about 100 pounds.

LOADING HOLE

The cartridges are carefully packed in a cylindrical shell ranging usually from 3 to 5 feet in length, made of tin or galvanized iron drawn out to a point at the lower end to prevent it from catching in its descent down the hole, open at the upper end and provided with a wire handle or bail. Such a container can be easily made from an ordinary stove-pipe. It should always be at least an inch smaller in diameter than the borehole. If there is standing water in the hole, as is usually the case, and the hole is of considerable depth, there should be an opening in the lower end of the shell, so that the water may pass through the shell and equalize the pressure on the explosive.

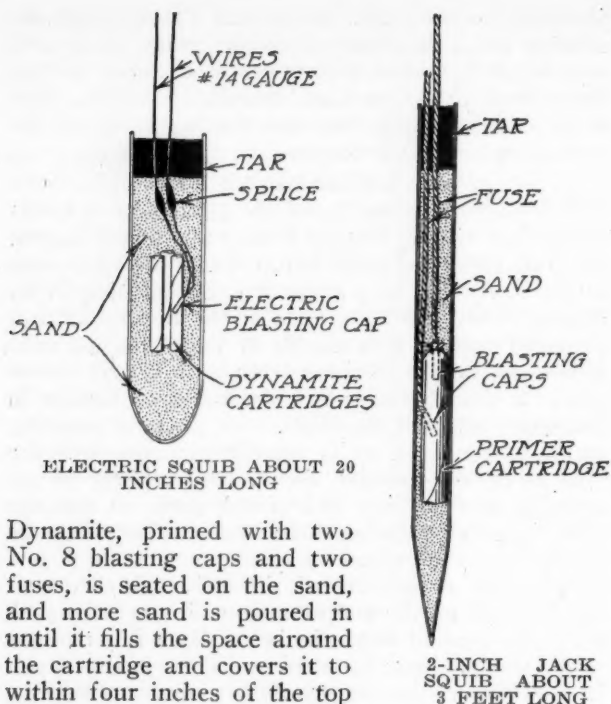
When the shell is loaded, the bail is placed over a special hook on the end of a stout line and the shell is slowly lowered down the hole. By a few motions of the line the hook can then be freed and drawn up. In shooting a very deep well, several shells may be necessary to hold the required charge. If so, they can be lowered successively and one allowed to rest on another. In case a charge is to be located at some distance up the hole instead of at the bottom, a shell provided with an anchor tip is used, that is, a tube about $1\frac{1}{4}$ inches in diameter projecting a few inches from the lower end. A tin pipe long enough to reach



to the bottom of the well is securely fitted over this tip and lowered into the hole ahead of the shell to serve as an anchor for it.

FIRING SQUIBS

The charge being seated, the next step is to explode it. This can be done by either the jack-squib or the electric squib. The jack-squib consists of galvanized pipe pointed at the lower end, which is filled as follows: Sand is poured into the pipe to a depth of about 6 inches; a cartridge of 60 per cent Straight



Dynamite, primed with two No. 8 blasting caps and two fuses, is seated on the sand, and more sand is poured in until it fills the space around the cartridge and covers it to within four inches of the top of the pipe. This remaining space is then filled with thick tar. As soon as the squib is prepared, both fuses are lighted, two being used in case one should fail, and the squib is dropped into the hole, point down. The length of the fuse should be so calculated that the squib will explode about the time it strikes the charge and thus detonate it.

The electric-squib of the oil-well shooter, which should not be confused with the Du Pont Electric Squib, is similar in construction to the jack-squib, but shorter and larger in diameter with a less sharply pointed end. It is filled to a depth of about 6 inches with sand and then a primer charge consisting of from one to three cartridges of 60 per cent Straight Dynamite is placed in the sand, one of the cartridges having been previously primed with a No. 8 Submarine Electric Blasting Cap. To the wires of this cap, at a point that will come well within the squib shell, are spliced No. 14-gauge copper wires long enough to reach to the bottom of the hole, and the splices are well taped. The remaining space is filled with sand topped with a layer of tar. The squib is carefully lowered by the wires until it rests upon the charge and is then fired by means of an electric blasting machine.

If the well has struck water there will probably be some standing water in the hole. Every foot of water in the hole exerts a pressure of .434 pounds per square inch. Consequently a column of water 100 feet high over a charge of explosives exerts a pressure of 43.4 pounds on every square inch of the area of the charge. It is this pressure which makes it necessary to protect the detonator from moisture by placing it in a sand-filled and tar-sealed metal shell. As the pressure may tend to force out the nitroglycerin from the cartridges, it is important to fire the shot as quickly as possible after loading. All preliminary preparations such as removing objects within danger and notifying people should be completed before the explosive is lowered into

the hole so that no time need be lost thereafter.

EFFECT OF EXPLOSION ON CASING.

Most drilled wells contain a casing throughout a part or the whole of their depth. Exploding a heavy charge at the bottom of the well is likely to damage this casing, either blowing it out in fragments, which may do harm if allowed to fly in the air, or causing it to collapse within the borehole, or splitting it longitudinally along the seam.

To prevent the casing from flying into the air it is well to build a heavy grill work over the mouth of the hole. This should be securely anchored to the ground. It is hardly possible to prevent splitting the casing but this is not necessarily a serious result, for a casing that is merely split can easily be pulled out and replaced.

If the casing collapses, however, it is more difficult to remove. In a well 300 or 400 feet deep there is less likelihood that the casing will be blown out or split than in a shallower well, but there is danger of collapse of whatever depth of the well. To prevent the casing from collapsing, the hole should be either full of water to the top or empty of water for fifty feet below the bottom of the casing. This last would mean that the hole was cased through only a part of its length and that the explosive charge was seated at least fifty feet below the casing. Suppose, for example, a well 100 feet deep containing 50 feet of casing from the surface down and 75 feet of water. The explosion of the charge would probably cause the casing to collapse at the surface of water. If the top of the water column was a few inches or a few feet below the casing, the collapse would probably occur at the bottom of the casing. If, however, the water was 50 feet below it, there would probably be no collapse at all. So it is advisable before firing either to fill the hole full of water or to bale it out at a point 50 feet below the bottom of the casing.

Well blasting is neither difficult or dangerous, and it has been found very successful in numerous instances in increasing the flow of water. Under ordinary conditions careful following of the methods described should produce satisfactory results. If peculiar conditions exist, it is well to secure advice from an experienced blaster or an explosives manufacturer.

Evils of Surety Bonding Systems

According to the sentiments expressed in its bulletin, by a number of prominent members of the Associated General Contractors, various faults of the prevailing system of surety bonding include the habit of distributing blank bid bonds haphazard to anybody, whether or not they have any investment, equipment or any experience and the pernicious idea that a responsible bidder is simply a contractor who can furnish sufficient bonds.

Some bonding companies have stated that bonding rates could be reduced if contractors would furnish affidavits of their financial abilities, experience and equipment; requirements that seem so rational that they should always be willingly agreed to by all parties. It has also been suggested that the substitution of certified cheques for bid bonds is likely to obtain more reliable contractors, although it was argued in opposition that a certified cheque is quite as easily obtained as a surety bond.

Table No. 3—Methods of Paying for Paving—Continued

| Name of City | Percentage of Paving Cost | | Method of Calculating Assessments. | Payable in how many instalments. | Funds obtained by city by | Life of bonds, years. |
|-----------------------|--------------------------------|---------------|--|----------------------------------|------------------------------|-----------------------|
| | Assessed on abutting property. | Paid by city. | | | | |
| Massachusetts: | | | | | | |
| Arlington | all | ..... | ..... | 3 | tax levy | 3 |
| Athol ..... | ..... | all | ..... | .. | bonds | 20 |
| Brockton ..... | ..... | all | ..... | .. | both | 5-15 |
| Cambridge ..... | ..... | all | ..... | .. | bonds | 10-5 |
| Dartmouth ..... | ..... | all | ..... | .. | budget | .. |
| Easthampton .. | ..... | ..... | ..... | .. | budget | .. |
| Holyoke ..... | ..... | all | ..... | .. | bonds | 20 |
| Lawrence ..... | ..... | all | ..... | .. | both | 10 |
| Lynn ..... | ..... | ..... | ..... | .. | both | 10 |
| Pittsfield | 50% | 50% | By front ft., excl. intersections. | 5 | bonds | 10 |
| Quincy | 50% | 50% | By front foot. | 10 | bonds | 10 |
| Springfield ..... | ..... | all | ..... | .. | budget | .. |
| Webster ..... | ..... | all | ..... | .. | budget | .. |
| Michigan: | | | | | | |
| Alma | all | ..... | Front ft., excl. intersections. | 5 | budget | 5 |
| Ann Arbor | 80% | 20% | Benefits derived. | 10 | bonds | 10 |
| Battle Creek... | 3% | 1% | Front ft., excl. intersections. | 5 | bonds | 30 |
| Detroit | all | ..... | Front ft., excl. intersections. | 4 | budget | .. |
| Dowagiac | all | ..... | Front ft., excl. intersections. | 5 | budget | .. |
| Grand Rapids... | all | ..... | Front ft., excl. intersections. | 5-10 | bonds | 5-10 |
| Hastings | 60% | 40% | Front foot. | 10 | bonds | 10 |
| Highland Park. | all | ..... | 75% where mostly lots by front ft., excl. intersections. | 5 | budget | 2-6 |
| Holland | all | ..... | By front ft., excl. intersections. | 10 | bonds | 10 |
| Ironwood ..... | ..... | all | ..... | .. | both | 20 |
| Manistiquie .. | ..... | all | ..... | .. | budget | .. |
| Midland | 67% | 33% | Frontage except in special cases. | 10 | bonds | 10 |
| Niles | all | ..... | Front ft., excl. intersections. | 10 | budget | .. |
| Owosso | 60% | ..... | 50% repaving—foot frontage. | 5 | budget | .. |
| Sault Ste. Marie | 3% | 1% | Front foot. | 1-5 | bonds | 5-10 |
| Ypsilanti | 60% | 25% | 15% ward—front foot. | 10 | bonds | 1-20 |
| Minnesota: | | | | | | |
| Albert Lea.... | all | ..... | Front ft., excl. intersections. | 10 | both | 3-15 |
| Chisholm ..... | ..... | all | ..... | .. | levy and gen. fund | .. |
| Cloquet | all | ..... | Front ft., excl. intersections. | 3 | ..... | .. |
| Crookston | all | ..... | Front ft., excl. intersections. | up to 20 | budget | .. |
| Detroit ..... | ..... | ..... | ..... | 20 | bonds | 20 |
| Duluth | all | ..... | Front ft., excl. intersections—area considered. | 5 | both | 5 |
| Faribault | all | ..... | Front ft., excl. intersections. | 10 | revolving funds and warrants | 10 |
| Hibbing ..... | ..... | all | ..... | .. | budget | .. |
| Little Falls.... | 75% | 25% | Front foot. | 20 | both | .. |
| New Ulm | all | ..... | Front ft., excl. intersections. | 4 | both | 10-20 |
| Red Wing | all | ..... | Front ft., excl. intersections. | 15 | both | .. |
| Rochester | all | ..... | Frontage. | 10 | bonds | 10 |
| St. Paul ..... | ..... | ..... | ..... | 10 | budget and tax | 20 |
| Two Harbors... | ..... | ..... | 50% sts. and all but intersections on aves. by ft. frontage. | none | budget | .. |
| Willmar | all | ..... | Front ft., incl. intersections. | 10 | ..... | 11 |
| Winona | all | ..... | By front ft. excl., intersections. | 10 | budget | .. |
| Mississippi: | | | | | | |
| Canton | 3% | 1% | Front foot. | 2 | both | 20 |
| Clarksdale | 2% | 1% | Front ft., excl. intersections. | 4 | bonds | 20 |
| Greenwood | 2% | 1% | Front foot. | 5 | bonds | 20 |
| Hattiesburg | all | ..... | Front ft., excl. intersections. | 10 | bonds | 10 |
| Natchez | 1% | 2% | Front ft., intersections by city. | .. | ..... | .. |
| Missouri: | | | | | | |
| Carthage | 3% | 1% | Front ft., incl. intersections. | 1-5 | bonds | 20 |
| Caruthersville. | all | ..... | Front feet. | 5 | ..... | .. |
| Jefferson City . | all | ..... | Front ft., incl. intersections. | 5 | ..... | .. |
| Joplin | all | ..... | Front ft., incl. intersections. | 5 | budget | .. |
| Kansas City .. | all | ..... | Front ft., incl. intersections. | 4 | ..... | .. |
| Poplar Bluff .. | all | ..... | By front ft., tax bill. | 5 | ..... | 5 |
| Sedalia | all | ..... | By front ft., incl. intersections. | 5 | ..... | .. |
| Springfield .. | all | ..... | Front foot. | 5 | ..... | .. |
| St. Charles | all | ..... | Front ft., incl. intersections. | .. | ..... | .. |
| St. Louis | all | ..... | 1/2 on frontage, 1/2 on area. | 3-10 | bond | 20 |
| Webster Grove. | all | ..... | Front foot. | 5 | budget | .. |
| Nebraska: | | | | | | |
| Columbus | all | ..... | Ft. frontage, intersections by city (See Note) | 10 | budget | .. |
| Fremont | all | ..... | By area, excl. intersections. | 10 | bonds | 5-10 |
| Lexington | all | ..... | Intersections by city. Assessments extended back to center of block. | 20 | bonds | 20 |
| Lincoln | all | ..... | Front foot. | 10 | ..... | .. |
| Nebraska City.. | all | ..... | Ft. frontage and depth of property, excl. intersections. | 10 | bonds | 10-5 |
| Omaha | all | ..... | By area, excl. intersections. | 10 | bonds | 20 |
| Nevada: | | | | | | |
| Reno | all | ..... | Front ft., excl. intersections. | 10 | both | 10 |
| Winnemucca .. | ..... | all | ..... | 2-3 | budget | .. |
| New Hampshire: | | | | | | |
| Laconia ..... | ..... | all | ..... | .. | budget | .. |
| New Jersey: | | | | | | |
| Bayonne ..... | ..... | ..... | By front ft., excl. intersections. | 3 | bonds | 10 |
| Bloomfield | 50% | 50% | By front foot. | 10 | bonds | 10 |
| East Orange .. | all | ..... | 50% for repaving. By front ft., excl. intersections. | 10 | bonds | .. |
| Englewood ..... | ..... | ..... | By front foot. | 2 | budget | 10 |
| Fort Lee ..... | ..... | ..... | By zones. | 10 | bonds | .. |
| Freehold ..... | ..... | ..... | By front foot. | 5 | bonds | 20 |
| Garfield | 3% | 1% | By front ft. (See Note). | 10 | bonds | .. |
| Irvington | all | ..... | By front ft., acc. to benefits, intersections by city. | 10 | notes | .. |
| Long Branch .. | 1% | 3% | By front foot. | .. | bonds | 20 |

Methods of Paying for Paving—Continued

| Name of City | Percentage of Paving Cost | | Method of Calculating Assessments. | Payable in how many instalments. | Funds obtained by city by | Life of bonds, years. |
|----------------------|--------------------------------|---------------|---|----------------------------------|---------------------------|-----------------------------|
| | Assessed on abutting property. | Paid by city. | | | | |
| New Jersey—Continued | | | | | | |
| Millville | 50% | 50% | Front ft., excl. intersections. | 5 | bonds and notes | .. |
| Montclair ..... | ..... | ..... | Acc. to benefits. | 10 | bonds | 5-10 |
| Newark ..... | ..... | ..... | By area, intersections by city. | 5 | bonds and budget | 30 |
| Newton ..... | ..... | all | ..... | .. | both | 1 |
| Nutley | 80% | 20% | Front ft., excl. intersections. | 10 | bonds | 10 |
| Phillipsburg ..... | ..... | all | ..... | .. | both | .. |
| Salem ..... | ..... | all | ..... | .. | budget | .. |
| Summit ..... | ..... | all | Benefits. By front foot. | 1 | both | life of impv. |
| New York: | | | | | | |
| Albany | all | ..... | Repaving by city. Front foot. | 5-10 | bonds | 10 |
| Binghamton | 50% | 50% | Front ft., excl. St. intersections. | 3 | both | 5 |
| Buffalo | all | ..... | Repaving $\frac{1}{2}$ prop., $\frac{1}{2}$ city. | .. | .. | .. |
| Corning | $\frac{2}{3}$ | $\frac{1}{3}$ | Front foot. | 5 | budget | .. |
| Dansville | 50% | 50% | Front ft., excl. intersections. | 4 | budget | .. |
| Fairport | $\frac{2}{3}$ | $\frac{1}{3}$ | Front foot. | 20 | bonds | 20 |
| Fulton | $\frac{2}{3}$ | ..... | Front ft., excl. intersections. | 10 | bonds | 10 |
| Geneva | $\frac{2}{3}$ | $\frac{1}{3}$ | Front foot. | 10 | bonds | 20 |
| Glens Falls | $\frac{1}{2}$ | $\frac{1}{2}$ | Front foot. | 1 | budget | .. |
| Gloversville | 75% | 25% | Front ft., excl. intersections. | 5 | both | 5 |
| Gouverneur ..... | ..... | all | ..... | .. | budget | .. |
| Haverstraw ..... | ..... | all | ..... | .. | bonds | 30 |
| Herkimer | $\frac{1}{2}$ | ..... | $\frac{1}{2}$ curb—front ft., incl. intersections. | 5 | budget | .... |
| Hornell | $\frac{2}{3}$ | $\frac{1}{3}$ | Foot frontage. | 5 | bonds | .. |
| Hudson ..... | ..... | all | ..... | .. | bonds | not to exceed life of impv. |
| Hudson Falls... | $\frac{2}{3}$ | ..... | By area. | 1 | both | 25 most |
| Lackawanna .. | 50% | 50% | Curb—all to prop.—ft. frontage. | 20 | bonds | 20 |
| Little Falls .. | 50% | 50% | ..... | 5 | bonds | .. |
| Lockport | $\frac{2}{3}$ | $\frac{1}{3}$ | Front foot. | 10 | budget | .. |
| Middletown .. | $\frac{1}{2}$ | $\frac{1}{2}$ | Front foot. | 5 | bonds | 25 |
| New Rochelle... | ..... | ..... | By front foot. | .. | ..... | .. |
| New York City: | | | | | | |
| Brooklyn Boro. | Determined by Bd. of Est. | ..... | Front foot. | 1 or 10 | bonds | 5 to 50 |
| Bronx Boro .. | All of new. | All repaving. | Front foot of property benefitted. | 10 | bonds | .. |
| Manhattan Boro | All of new. | All repaving. | Front foot. | 10 | bonds and budget | 10 |
| Queens Boro .. | Nearly all. | ..... | Front foot. | 10 | bonds | .. |
| Richmond Boro | All of new. | All repaving. | Area of lot; intersections half block each way. | 10 | bonds | 10 |
| Niagara | all | ..... | By front ft., excl. intersections. | 10 | both | .. |
| No. Tonawanda | all | ..... | By front foot. | 10 | bonds | 10 |
| Olean | all | ..... | By front ft., excl. intersections. | 10 | bonds | 10 |
| Oneida | $\frac{2}{3}$ | $\frac{1}{3}$ | By front ft., excl. intersections. | 10 | bonds | 10 |
| Oneonta | $\frac{2}{3}$ | $\frac{1}{3}$ | By front ft. or sq. yardage. | 10 | bonds | short term |
| Plattsburgh .. | ..... | all | ..... | .. | bonds | 20 |
| Port Chester... | 50% | 50% | Front foot. | 1-3 | bonds | 10 |
| Port Jervis .. | $\frac{1}{4}$ | $\frac{3}{4}$ | Front ft., excl. intersections. | 5 | ..... | .. |
| Poughkeepsie .. | $\frac{2}{3}$ | $\frac{1}{3}$ | Front ft., excl. intersections. | 10 | budget | 1-10 |
| Rochester | all | ..... | Front foot. | 3-10 | bonds | .. |
| Schenectady .. | all | ..... | Front foot. | 5 | resurf. by bonds | 10 |
| Victor ..... | ..... | all | ..... | .. | bonds | 20 |
| Watertown ..... | ..... | ..... | Front ft., excl. intersections. | 5 | both | .. |
| North Carolina: | | | | | | |
| Asheville | $\frac{2}{3}$ | ..... | Front foot. | 3 | bonds | .. |
| Concord | $\frac{1}{4}$ | ..... | ..... | 10 | bonds | 10 |
| Greensboro .. | $\frac{1}{2}$ | ..... | Front ft., excl. intersections. | 10 | bonds | 1-20 |
| Marion | $\frac{1}{2}$ | $\frac{1}{2}$ | Frontage. | 3 | bonds | 30 |
| Mount Airy ... | ..... | ..... | Front foot. | 1 | budget | .. |
| Wilson | $\frac{2}{3}$ | $\frac{1}{3}$ | Front ft., excl. intersections. | 10 | bonds | 20 |
| North Dakota: | | | | | | |
| Dickinson | all | ..... | In prop. to benefits. | 10 | ..... | .. |
| Fargo | all | ..... | Benefits derived. | 15 | ..... | .. |
| Mandan | all | ..... | Area. (See note.) | .. | warrants | 20 |
| Ohio: | | | | | | |
| Akron | all | ..... | Front ft., excl. intersections. | 10 | bonds or notes | 10-5 |
| Alliance | all | ..... | City 2% of intersections. | 20 | bonds | 10-20 |
| Ashtabula | 98% | 2% | Front foot. | 10 | bonds | 10 |
| Barnesville .. | ..... | 1-50 | Front ft., excl. intersections. | 10-15 | bonds | 5-10 |
| Bellaire | 98% | 2% | Repair 50%-50%. Front ft., excl. intersections. | 10 | bonds | 10 |
| Bucyrus | 95%-98% | ..... | Front foot. | 10 | bonds | 10 |
| Cleveland | 98% | 2% | Front ft., excl. intersections. | 10 | bonds | 20-10 |
| Cuyahoga Falls | 98% | 2% | Foot frontage. | 10 | bonds | 10 |
| Delaware | 98% | 2% | Front ft., excl. intersections. | 10 | bonds | 10 |
| East Palestine. | 98% | 2% | Front ft., excl. intersections. | 10 | bonds | 10 |
| Fostoria | 98% | 2% | Front foot. | 10 | bonds | 10 |
| Fremont | 98% | 2% | Repaving 50%-50%. Front ft., excl. intersections. | 10 | bonds | 10 |
| Greenville | 98% | 2% | Benefits, intersections by city. | 10 | bonds | 10 |
| Hillsboro | 98% | 2% | Front ft., excl. intersections. | 10 | bonds | 10 |
| Jackson | 98% | 2% | Front ft., excl. intersections. | 10 | bonds | 1-10 |
| Lakewood | 98% | 2% | Front foot by benefits, excl. intersections. | 10 | bonds | 10 |
| Lancaster | 90% | 10% | 50-50 repav. Front ft., excl. intersections. | 10 | bonds | 8 |
| Lawton | 100% | ..... | Front foot. | 2 | bond | 10 |
| Lima | 98% | 2% | Benefits. By front ft., excl. intersections. | 10 | bonds | 10-20 |
| London | 98% | 2% | Front foot. | 19 | bonds | 10 |
| Lorain | 85% | 15% | Front ft., excl. intersections. | 10 | bonds | 10 |
| Marysville | 98% | 2% | Front ft., excl. intersections. | 5-20 | bonds | 5-20 |
| Middletown .. | 98% | ..... | Front foot and benefits. | 10 | bonds | 10-15 |
| Mt. Vernon ... | 98% | 2% | Benefits, front ft. and percent of tax values. Intersections by city. | 10 | bonds | 10 |

To be continued.

Recent Legal Decisions

CONSTRUCTION OF GARBAGE REMOVAL CONTRACT—SEPARATION OF EXCLUDED MATTER

A party contracting with another to perform a work has the right to proceed free from the hindrance of the other party, and if the latter prevents the doing of the work to such an extent as to render the performance difficult, and largely diminish the profit, or increase the cost, the contractor may lawfully abandon the performance. In an action by a city to recover damages for the non-performance of a contract for the removal of garbage, it appeared that the defendant was by the terms of the contract entitled to have all garbage offered free from oyster shells, and other rubbish which the contract expressly excluded. The New Jersey Court of Errors and Appeals holds, *Atlantic City v. Farmers' Supply & Products Co.*, 115 Atl. 388, that, although the contract did not expressly require the city to offer the garbage in the condition contracted for, the law will imply a covenant that the city will perform a correlative duty, if it is the manifest intention of the parties, and cannot by its own act prevent the contractor from performing the contract according to its terms. It being obvious from the terms of the contract that it was the intention of the parties that the city should co-operate to the extent of offering the character of garbage contracted to be collected, and the contract not requiring the contractor to go to the expense of separating the garbage, if the city did not do its duty, but by its conduct did, wilfully or carelessly, create a condition which imposed an additional burden on the contractor, the latter had a right to complain to the city in order that it might remedy this illegal condition.

MEASURE OF DAMAGES FROM NEGLIGENT OPERATION OF SEWERAGE SYSTEM

The Texas Court of Civil Appeals holds, *City of Honey Grove v. Mills*, 235 S. W. 267, that damages to a plaintiff by the negligent operation of a septic tank are personal to the plaintiff, and he could therefore recover only for injuries to himself and his wife, and not for the special damages suffered by his two adult daughters. It also holds that if the city, as here, has constructed a sewer and connected it with a branch, at times overtaxing its capacity, or allowing insoluble matters to accumulate in it and obstruct the flow of the waters of the branch, causing it to flow back on private property, its liability for the resulting damage does not differ from that of an individual who so wrongfully or negligently manages his property as to injure another person. The nuisance only became so by the manner of the negligent or wrongful use of the branch as the outfall for the sewer. The jury made the finding of fact that the alleged nuisance was, under the evidence, abatable by the exercise of ordinary care in the operation. In this situation, it was held error to permit evidence as to the depreciated value of the land, the proper measure of damages being the depreciation in the rental value, or use, or special damages to the land.

CITY HELD NOT LIABLE FOR FALL OF DEFECTIVE LIGHT POLE, DEFECT NOT BEING APPARENT ON INSPECTION

A team of mules, becoming frightened, dashed from the roadbed onto a grassy plot, striking a defective electric light pole maintained by the city, with such force that it broke off near the ground, and also near the top, and fell into the wagon, breaking the vehicle and causing the team to run away, inflicting personal injuries on the driver, for which he sued the city. The Kentucky Court of Appeals holds, *Cundiff v. City of Owensboro*, 235 S. W. 15, that the city was not liable, first, because the frightening of the team, and not the defective condition of the pole, was the approximate cause of the injury; second, the evidence showed that the pole appeared sound and the city had no knowledge whatever of its defective condition. A municipal corporation is not an insurer of the safety of its public ways, but is held only to the exercise of ordinary care to keep such ways reasonably safe, and if a street becomes latently defective, without manifesting such dangerous condition, and its dangerous condition is not known to the city, and could not have been known to the city by the exercise of reasonable care, the city is not liable for an injury resulting from such defect to a traveler rightfully upon the street. Although the city inspector examined the pole at regular intervals before it fell, he could not see and did not know of its internal defective condition.

Until the city was charged with knowledge of the defective condition of the pole, it was not required to take it down or replace it.

ORDINANCES REGULATING MOVEMENTS OF STREET CARS TO ALLOW PASSAGE OF FIRE APPARATUS HELD VALID

The Indiana Appellate Court holds, *Union Traction Co. v. City of Muncie*, 133 N. E. 160, that ordinances relating to the speed of street cars within the corporate limits of the city and at street crossings, the right of way of its fire department over its streets, and the duty of persons in charge of street cars to stop them and remain stationary upon the approach of any fire apparatus are within the police power and apply to a street railway, although passed after the railway received its franchise. The action was one by the city against a street railway company for damages to the city's fire truck and apparatus through collision at a street intersection, caused by violation of the ordinance.

COMPLIANCE WITH ORDINANCE AS TO FIRE HOSE COUPLINGS

The Delaware Court of Chancery holds, *Taylor v. Smith*, 115 Atl. 405, that a city department cannot be enjoined from purchasing screw couplings for fire hose under an ordinance requiring snap couplings to be used, but not forbidding the purchase of screw couplings. If it should be unlawful to use such when purchased, the proper time to ask for injunction would be when the use was undertaken.

NEWS OF THE SOCIETIES

CALENDAR

March 14—**SOCIETY OF INDUSTRIAL ENGINEERS.** Auditorium Hotel, Chicago.

March 14—**ENGINEERING SOCIETY OF BUFFALO.** Engineers' Club. Secretary, N. L. Nussbaumer, 80 West Genesee St., Buffalo.

March 14-16—**INTERNATIONAL GARDEN CITIES AND TOWN PLANNING ASSOCIATION.** International conference. London, England.

Mar. 14-16—**AMERICAN RAILWAY ENGINEERING ASSOCIATION.** Annual convention. Chicago, Ill.

Mar. 15—**NEW YORK SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.** Engineering Societies Bldg., New York City.

Mar. 18—**ROCHESTER ENGINEERING SOCIETY.** Quarter-centennial dinner.

March 22-23—**INDIANA SANITARY AND WATER SUPPLY ASSOCIATION.** 15th annual convention. Claypool Hotel, Indianapolis.

March 22-23-24—**IOWA ROAD OFFICIALS.** Tenth annual conference State Highway Commission's office, Ames, Ia.

Mar. 29-30—**ILLINOIS SECTION, AMERICAN WATER WORKS ASSOCIATION.** Fourteenth annual meeting. Urbana, Ill.

Apr. 19-21—**AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.** General meeting. Chicago, Ill.

Apr. 19-21—**TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA.** Spartanburg, S. C.

Apr. 27-30—**BUILDING OFFICIALS' CONFERENCE.** Apr. 27-28, Cleveland, O.; Apr. 29, Massillon, O.; Apr. 30, Youngstown, O.

May 15-19—**AMERICAN WATER ASSOCIATION.** 42 Annual Convention, Bellevue-Stratford Hotel, Philadelphia. Secretary J. M. Diven, 153 W. 71 St., New York.

June 4-6—**AMERICAN ASSOCIATION OF ENGINEERS.** 8th Annual Convention. Salt Lake City, Utah.

June 13-16—**CANADIAN GOOD ROADS ASSOCIATION.** Annual convention. Victoria, B. C.

June 26-July 1—**AMERICAN SOCIETY FOR TESTING MATERIALS.** 25th annual meeting. Chalfonte-Hadden Hall Hotel, Atlantic City, N. J.

Sept. 25-28—**SOUTHWEST WATER WORKS ASSOCIATION.** Annual convention. Hot Springs, Ark.

Oct. 9-13—**AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS.** Annual convention. Cleveland, Ohio.

IOWA ROAD OFFICIALS IN CONFERENCE

The tenth annual conference of Iowa Road Officials will be held in Ames at the headquarters of the State Highway Commission, Wednesday, Thursday and Friday, March 22, 23, 24. It is anticipated that approximately 400 county engineers, supervisors, auditors and township clerks and trustees will take part in the meeting, which promises to be the most important so far held.

Matters of administration, policy and technical problems will occupy the entire time of the conference. Supervisors, engineers and auditors who have special problems to work out and which they would like to have taken up for discussion, are asked to send

them in as suggestions for the program as soon as possible.

The conference will be closed to all except bonafide county and township officials. Profiting by the experience of the past, manufacturing and publishing companies are again asked to route their agents and salesmen in other territory during the time of the conference. The shortness of the time allowed for the meeting, the number of matters to be taken up and the importance of the things to be considered, make it imperative that the time of those in attendance be absolutely unhampered. Highway engineers from neighboring states, with problems similar to those in Iowa, will be present to speak and take part in the discussions.

BOSTON SOCIETY OF CIVIL ENGINEERS

The February 15th meeting of the Boston Society of Civil Engineers was addressed by Mr. Gerret Fort, vice-president of the Boston and Maine Railroad, on "Problems of Freight Transportation in New England," and Mr. Benjamin Franklin Fitch of the Motor Terminals Co. of New York on "Coordination by the Unit Containers System by the Railways, Waterways, Highways, and Traction Lines for a Relief of New England Transportation."

The meeting of February 28th at Tremont Temple, was addressed by John N. Cole, commissioner of public works, Commonwealth of Massachusetts, on "Problems Due to the Growth of the Motor Truck as a Freight Carrier," and by Prof. W. K. Hatt, Director of Advisory Board on Highway Research, on "General Situation in Highway Transport and the Need of Research in That Field."

NEW JERSEY SEWAGE WORKS ASSOCIATION

The annual meeting of the New Jersey Sewage Works Association held at Trenton on February 17th, was devoted to an exchange of experience on the part of sewage works operators and other engineers. Chief among these were Harry Beaumont, who described hypochlorite disinfection of the Imhoff tank sprinkling filter effluent at the Pennypack, Philadelphia, sewage works; and Prof. R. O. Smith, who described the research studies being made jointly by the N. J. State Experiment Station and the State Dept. of Health, which included the biology of sewage treatment and experiments in facilitating sludge dewatering.

S. F. Miller, of the Pacific Flush Tank Co., was elected president, and Myron E. Fuller, New York City, was re-elected secretary-treasurer.

KENTUCKY ASSOCIATION OF HIGHWAY CONTRACTORS

At the convention in Louisville, February 21 and 22, the reports of the principal committees were on finance, legislation, publicity, ways and means and future activities, which were discussed, and papers presented on:

"Kentucky's Road Situation," by Joe S. Boggs, State Highway Engineer.

"Reduction of Insurance Costs by the Application of Safety Methods," by S. J. Williams, chief engineer, National Safety Council, Chicago.

"A Close-up View of Workmen's Compensation Insurance," by Lewis F. Tuells, vice-president, Liberty Mutual Insurance Company, Boston.

"The New Specifications of the Highway Department," by W. N. Bosler, principal assistant engineer, Department of State Roads and Highways, Frankfort.

"The Relationship Between Contractor and Surety," by Franklin D. Roosevelt, vice-president, Fidelity & Deposit Company of Maryland.

At the banquet Rodman Wiley was toastmaster and the principal speakers were: H. Green Garrett, "A Voice from the Throne"; Gov. Edwin P. Morrow, "Co-operation"; Gen. R. C. Marshall, "A Message from the National Association"; Frank Cassell, "On the Rock Pile"; Mayor Huston Quin, "The Proper Treatment of Highwaymen."

BROOKLYN ENGINEERS' CLUB

At the informal library talk February 16, a lecture on "Picturesque and Progressive Japan" was delivered by Dr. Thomas Edward Potterson, who illustrated it by very interesting lantern slides. The lecture was preceded by a short musical program.

NEW YORK SECTION AMERICAN SOCIETY OF CIVIL ENGINEERS

At the regular monthly meeting February 15th, a paper on "How Can the New York Transit Problem Be Solved," was presented by speaker Daniel L. Turner, consulting engineer to the Transit Commission of New York City.

Mr. Turner laid out in a clear and thorough way the underlying principles that should be considered in solving New York's transit problem, covering financial and traffic considerations.

During the business meeting consideration was given to a request of the Board of Direction of the Parent Society that the sentiment of the Local Sections on the question of the Society becoming a member of the Federated American Engineering Societies be indicated to the directors.

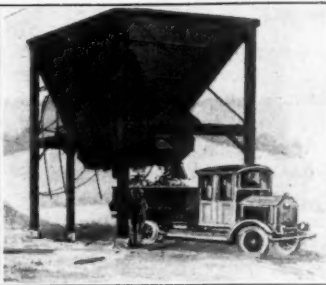
It was found necessary to cancel the discussion on "Removal of Solid Wastes" originally scheduled for this meeting.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations



BLAW-KNOX MEASURING BATCHER GATE IN OPENED POSITION.



STEEL BIN FITTED WITH BLAW-KNOX MEASURING BATCHERS.

ALL STEEL STORAGE BIN AND ADJUSTABLE MEASURING BATCHER

A steel storage bin and adjustable measuring batcher just put on the market by the Blaw-Knox Co. weighs less than an equivalent wooden bin, costs less for shipment, is more quickly and easily dismantled, is more durable, and being of standard size units is a sectional equipment that possesses great elasticity and can be enlarged or reduced to fit any size job. It is of convenient height to be loaded by a locomotive crane and clamshell bucket and has clearance for loading any truck body on the market.

The bins themselves are of the suspended hopper bottom type, designed for maximum strength and economy in units of 15 tons capacity, each equipped with two patent adjustable measuring batchers that automatically deliver exact required amounts of aggregate, are adjustable to any specified proportions, operate by gravity and are controlled from the surface of the ground by levers that can be handled separately or in combinations by the truck driver, thus enabling him to fill several compartments in the truck body simultaneously or successively and complete his load in 10 seconds if necessary. These gates may also be applied to any wooden bin or other steel bin already in service.

The measuring batchers have conical upper parts moving inside the lower parts and adjustable to vary the amount of aggregate delivered by a fraction of a cubic foot at will. The lock bolts furnished with the batcher enable the contractor or engineer to seal the adjusting mechanism so that it cannot be changed without his knowledge and consent, thus eliminating the necessity for any inspector or superintendent at the storage bin, and insuring perfect regularity of proportion in the mix.

The batcher includes the bin gate or bottom of storage bin, and when

the gate is closed the material in the batcher is struck off at the same time automatically, and the correct volume is then held suspended in the batcher until the bottom gate is opened to dump it.

GASOLINE LOCOMOTIVE FOR TUNNELS, QUARRIES, ETC.

The locomotives manufactured by the Brookville Truck & Tractor Co. are recommended for Ford efficiency applied to gasoline haulage, particularly in tunnels, quarries, road construction and other operations where a light industrial hauling system is desired.

They are of the underslung type, with cast iron frame, swiveled, pony front, operating over 20-foot radius curves and are made 24 to 56-inch gage. A lighter type with a riveted channel bar frame weighs from 2,850 pounds to 3,250 pounds and, like the heavy type, has Hyatt roller bearings and pony wheels (if especially ordered). Both types are equipped with the new Ford Ton Truck motors, transmissions and worm-drive differentials.

The Ford high and low speeds go forward and reverse, giving a range of from 4 to 15 miles, which together with the swivel front eliminates the necessity

of turntables or "y's" because the locomotive is efficiently operated in either direction. The total daily cost of operation for driver, gas and oil is estimated at \$6.75 with no cost on idle days while the operating daily cost for five mules required to do the same service is \$30 and there is a fixed charge of \$8 per day for idle days.

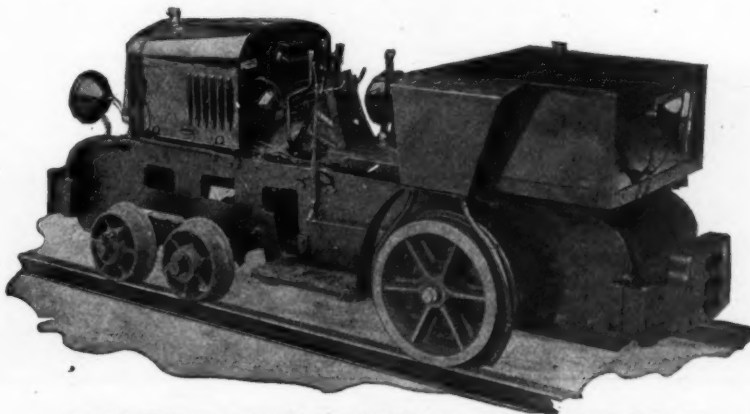
Testimonials from a number of purchasers credit the locomotive with efficiency in various kinds of work. One of them hauled a gross load of 47,500 pounds, another hauled 6 tons up a 10 per cent grade on high gear, another hauled men to and from work, making 14 miles to the gallon of gasoline, another is credited with a saving of \$70 per month on labor alone and handles 100 tons in five hours.

THE AGGREGATE METER

The all-steel AggreMeter, manufactured by the Erie Steel Construction Co., is an equipment designed to insure the rapid loading into multiple compartment motor trucks or into sets of batch boxes, of the exact required proportions of fine and coarse aggregate for delivery to concrete mixers, especially for highway construction. The Aggre-Meter consists essentially of two 35-ton hopper bottom steel bins supported on two steel towers placed far enough apart to permit the passage of a motor truck or industrial railway between them.

An overhead service track connects the towers just below the hoppers and on it there are installed two measuring hoppers, each consisting of four compartments and connected by a spacer equal to the distance from the center of the industrial track to the center of the hoppers. The two are traversed from one hopper to the other by a windlass and endless rope, working them both together as a unit.

One measuring hopper, set under the



BROOKVILLE TRUCK & TRACTOR COMPANY'S GASOLINE LOCOMOTIVE.

stone bin, is filled by a single movement of the operator's lever and when traversed by the windlass to the other hopper its contents are struck off by a fixed straight edge that insures the exact quantity of materials in the measuring hopper. When the stone hopper reaches the center of the industrial track, the sand hopper is automatically placed under the discharge gate of the sand bin and is filled while the stone hopper discharges into the truck or batch boxes.

The traversing mechanism, a single-drum hand winch, is then reversed and the stone hopper returned to position under the stone bin, while the sand hopper is placed over the truck or industrial track and its contents discharged, completing the load of the truck or batch boxes, and so on, the hoppers reciprocating and charging and delivering either sand or stone at each movement. The measuring hopper may be made with one, two, three or four compartments and any one of these may be held locked at the will of the operator or opened with each movement. The automatic striking of the contents insures accuracy of measurement and obviates the necessity of inspection after the dimensions of the hopper have been verified.

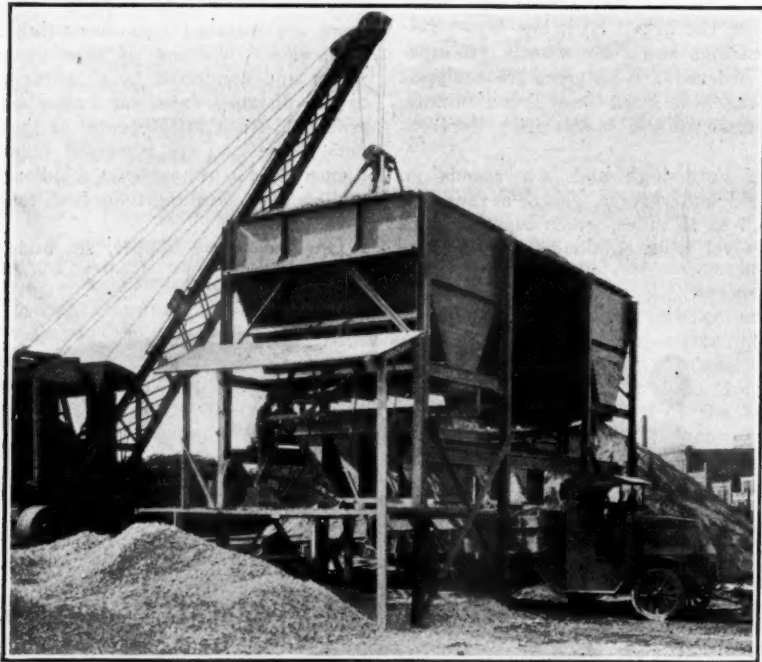
The plant is operated by only one or two laborers, saves truck time by loading a 4-compartment truck in less than one minute, has capacity sufficient to keep two large mixers going at full speed, and is claimed to cost less than wooden hoppers on account of the durability and facility of dismantling and re-erection. It is claimed to have capacity for loading eighty 6-bag batches per hour, a quantity sufficient to keep two 6 bag paving mixers working at full

capacity and allowing only 1½ minutes per batch.

The bin gates are operated by the attendant while the measuring hopper gates, controlled by a large hand wheel and spur gear, are operated by the driver of the motor truck. The gates open slowly, minimizing the impact and consequent injury to the truck body. The measuring hoppers, set to clear the truck bodies, are several feet below the tops of the truck cabs, which do not pass under them, thus reducing materially the height from which the heavy aggregate falls into the truck body.

Whether or not the specifications prohibit storage of aggregate on subgrade, its measurement and delivery from a central proportioning plant is claimed to be more convenient and profitable to the contractor, because of a saving of 10 per cent. loss (enough in 2½ miles of road to pay for the AggreMeter); because there are no interruptions to verify or correct proportions; because, in handling the aggregate, no dirt is mixed with it; and because, when the AggreMeter is used, as the truck is not spotted directly under the bin gate, there can be no overload of aggregate delivered for any batch.

In the construction of more than a mile of 18-foot concrete road in Erie County, Pa., with a 1¼-minute mix specified, the average speed of paving was 440 linear feet in 10 hours. The 680 truck-loads of aggregate were measured and delivered to three 5-ton trucks by an AggreMeter that loaded the 2331 six-bag batches with one operator in an average time of 60-75 seconds per truck-load. The contractor stated that during the same number of days the AggreMeter could have loaded 10,800 batches.



LOADING BATCHES OF AGGREGATE WITH ERIE STEEL CONSTRUCTION COMPANY'S AGGREGATE METER.

PERSONALS

Laurent, Arthur St., assistant deputy minister of the Canadian Department of Public Works, has been appointed chief engineer to succeed the late E. D. Lafleur.

MacCutcheon, John, has been appointed superintendent of bridges for Bridgeport, Conn.

Fourmy, James M., has been appointed state highway engineer and W. F. Cooper assistant state highway engineer of Louisiana.

Craven, William, bridge engineer of the North Carolina State Highway Commission, has been appointed senior bridge engineer.

Cocke, W. F., assistant state highway engineer of Virginia, has resigned to become state highway engineer of Florida.

Maline, J. F., has been appointed director of public service of Cleveland, Ohio.

Syme, George F., supervising engineer, North Carolina State Highway Commission, has been appointed senior highway engineer.

Campbell, Homer C., has been appointed city manager of Akron, Ohio.

Wiles, H. O., formerly city engineer of Bluefield, W. Va., has been appointed county engineer of Wayne county, W. Va., to succeed H. A. Levering.

Allen, George K., Red Bank, N. J., has been appointed county engineer of Monmouth county, N. J., succeeding George B. Cooper.

Bunker, Stephen S., has been appointed city engineer of Bangor, Maine.

Newman, Gustavus O., chief engineer for the San Joaquin Light and Power Company, died in Los Angeles Cal., on December 4th.

Archibald, Alexander, mayor of Newark, N. J., died on February 11th, following an operation.

WILLIAM C. SARGENT

William C. Sargent for twenty-two years secretary and also a director of the Chain Belt Company, Milwaukee, died suddenly on February 5th as a result of heart failure. He was seventy-three years of age and had been in ill health for several years.

Mr. Sargent, prominent in industrial circles of Milwaukee, and St. Paul, had a wide national acquaintanceship. He was born at Troy, New York, February 2nd, 1849. In 1871 he moved West, locating at St. Paul. In 1900 he went to Milwaukee to become secretary and later a director of the Chain Belt Company. He was also a director of the Federal Malleable Company, West Allis, Wisconsin. His father was one of the founders of the Terre Haute, Alton and St. Louis Railroad. Mr. Sargent established many of the early business connections of the Chain Belt Company, many of which are still among the company's jobbers.